SEMINARY ROOM
MECHANICAL ENGINEERING DEPARTMENT


# ELECTRIC RAILWAY JOURNAL

Volume 44,
Number 22
Nov. 28, 1914

McGraw Publishing Co., Inc.

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# Electric Railway Journal

*New York, November 28, 1914*

Volume XLIV No. 22

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JAMES H. MCGRAW, President. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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# Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIV NEW YORK, SATURDAY NOVEMBER 28, 1914 No. 22

**FUNCTIONS OF THE A. E. R. A. SECTION**

As one reads the reports of the association company section meetings in the "Association News" column of this paper, and especially if he has the good fortune to be an attendant upon the meetings of a section, he cannot but be impressed with the substantial and helpful character of the section movement. When President Allen faced an enthusiastic audience of three hundred or more on a stormy night in Newark last week he stated that the largest number of attendants at a session of the Atlantic City convention was less than three hundred. Obviously an institution which will bring out an audience like this from all parts of the State of New Jersey has something worth while to give its members. The active company section yields, among others, these benefits: It furnishes a medium through which the results of the work of the parent association can be disseminated locally. It furnishes an effective channel for the exercise of individual enthusiasm and initiative. It promotes loyalty to the local company and to the industry. It provides for give-and-take discussion of local problems, and it reduces operating friction, or, to change the figure, it provides a safety valve for the critical spirit. But while section work is good, its development cannot be forced. It depends for its success in any community upon the enterprise of a few individuals, and it must be initiated to meet a real local need. Given the need, together with suitable leadership, however, it will be found everywhere that the thinking class in the railway organization will support section meetings and other co-operative activities.

**HELPING THE SIGHTSEER**

The sightseeing vehicle is not so common in American cities as it is abroad because of the absence of historical places, remarkable buildings of past ages, art museums and the like. For all that it is doubtful whether American railways take advantage of the sightseeing business that is available. There are not many places in America with the charms of a Quebec or New Orleans, but there are many which for one reason or another do entertain many strangers, whether from day to day or on the occasion of conventions, fairs, etc. If there is enough permanent sightseeing business it can be secured largely for special car transportation at a special rate—say 25 cents to 50 cents for a complete trip with guide. Where a sightseeing car can attract business for many days of the year it will pay the company to build an open-tier car, say like that of Montreal and Quebec, from which the riders can get real snapshot views of the city. Wichita, Kan., at first thought does not suggest a promising place for sightseeing travel. Yet on the occasion of a recent dry-farming congress the Wichita Railroad & Light Company ran a "Seeing Wichita" car twice a day at 25 cents per trip. Furthermore, every employee was decorated with an "Ask Me" badge to encourage the diffident visitor to ask for information. Thus the company not only gained extra revenue but performed a service that was a great convenience to the stranger. Furthermore, the idea of offering every platform man as a guide showed the kind of spirit that leads the local public to feel that its railway system is doing good work to make the town a by-word for enterprising hosptality.

**PERMANENT TRAFFIC BUREAUS**

Although the traffic bureau, or traffic squad as it has sometimes been called, has been in use in some cities for at least ten years, the general growth of the idea of keeping continuous records of traffic and subjecting the whole service to periodical inspections by specialized observers has been singularly slow. It is true that a comparatively small amount of attention has been devoted to the extent of the possible savings that can be made through the annual expenditure of the several thousand dollars necessary to support a permanent staff of men for this work. However, this does not alter the fact that enormous savings are easily available in many cases. Even at the risk of meeting the "local conditions" argument, it might well be asked why the average schedule speed in one city is satisfactorily maintained at 10 m.p.h., although the speed in another town of about the same size and general character is only 8 m.p.h. In the former case the average car and its crew are performing 25 per cent more effective work than in the second case, and the cost of this work has been estimated to constitute fully half the total cost of operation. Of course, there is a reason for such differences in schedule speed, which might easily make the difference between failure and prosperity, and this reason is just what the traffic bureau is likely to know. If in such a case it was able to point out the real sore spots and to offer a remedy for them it would pay for itself even if none of its members ever did a stroke of work during the rest of their lives. Indeed, it may be safely said that an efficient traffic bureau is about the most inexpensive economy that can be introduced by any street railway of reasonable size, because the opportunities for saving time and money by the real study of traffic are, at once, the most prolific and the most completely neglected ones that can be found today in any of the various departments.

## PROBLEMS IN SPECIAL WORK STANDARDIZATION

In a recent editorial we urged the appointment by the Engineering Association of a committee on special work standardization and suggested that it begin with foundations. Following a study of the supporting structure, it appears that the question of standardizing layouts might next be considered. While the association has adopted standard dimensions for right and left-hand switches and mates for 100-ft. and 200-ft. radius curves, the scope of this good work could be enlarged to embrace standard spirals for lead curves, for which the lengths of connecting rails could be prescribed. The final step in this plan of special-work standardization could include the over-all dimensions for 90-deg. frogs, limiting dimensions for all frogs and crossings less than 90 deg. so as to permit the use of but a single joint in each rail between gage lines, and at the same time provide ample spread in the arms to facilitate the application of connections. Pioneer work of this character has been done on several large systems, and its economy is unquestioned.

The standardization of the design and materials employed in the manufacture of frogs, crossings, switches and mates also affords a vast field for constructive study. While the manufacturers have developed the art to a point where each knows the steel or cast-iron section required to meet certain loads, they no doubt would welcome a set of standards for various loadings, so that all could bid for work on the same basis. In the size of the binder casting section to carry certain loads there is a wide range of difference, owing to the diversity in methods of reinforcing or toughening the metal used by different manufacturers. The size of the rolled-rail-arm grip area and the method of preparing the rail to insure a positive bond between it and the casting may be specified by establishing certain minimum limits. These must necessarily vary with the different railway loads and should include a factor of safety to cover maintenance deficiency.

Insert fastenings and settings may also be standardized to a certain extent, including the size and number of bolts or wedges and the method of locking them in position. Regarding the size of the insert, there is not a wide difference of opinion among manufacturers, and, in fact, it is doubtful if many engineers have ever given it consideration. The thickness of the plate and the method of setting and fitting in the casting pocket are all subject to standardization to a limited degree. Gentle approaches to the narrow throatways and gradual changes from tread to flange or to equal flange and tread bearing could be specifically defined. Throatway widths and depths, however, will manifestly vary with the standard wheel flanges.

The foregoing suggestions represent in a general way what subjects could be taken up by a committee inquiring into the subject of special-work standardization. Undoubtedly the results of such a study would be of immeasurable benefit to the industry from the standpoint of economy, and the information collected would be of great intrinsic value.

## ELECTRIC RAILWAYS AND PUBLIC LIBRARIES

The communication from K. E. Walker, a librarian of New Haven, Conn., printed in this issue, discloses an ally to the improvement of conditions in electric lines of whose assistance insufficient advantage has been taken in the past. By means of a systematic effort to interest electric railway employees in the reading of technical literature Mr. Walker has secured very satisfactory results. His letter is indicative of what might be called the modern idea of the function of a library—namely, to study the literary needs of its own community and then to endeavor to meet these needs even if traditions must be violated in so doing.

The old-fashioned library was a cloistral place appealing only to the scholar, who moved silently among shelves laden with dust-covered tomes. The modern library possesses a different atmosphere and one more akin to that of a business office, and most of the readers have the appearance of seeking information which will be of assistance in their daily problems rather than abstract knowledge. There is a similar change in the appearance and attitude of the librarian. Formerly he seemed to look on the library as an end in itself and as a "collection" of interesting curiosities; he was willing to let it remain a stagnant literary pool. Now he is an alert specialist, keen to keep a stream of vital, useful knowledge flowing from the library to all parts of the community.

That the local libraries should be useful to an industry as important as the electric railway industry goes without saying, but it may be worth while to restate it for the purpose of raising in the mind of electric railway managers the question whether their own companies are utilizing all of the benefit of which the public libraries in the communities which they serve are capable.

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## SURPLUS AND CREDIT

One of the criticisms directed against the steam railroads at a recent rate hearing in Washington by the counsel representing the shippers was that some of the companies which petitioned for an increase in rates were earning a surplus in addition to paying dividends. The thought underlying this criticism is a common one and applies as well to rate hearings of electric roads as to those of steam roads. Carried to its logical conclusion, it would mean that no company is justified in asking for an increase in rates except as a means for keeping itself out of bankruptcy. Nevertheless there is a close relation between a surplus and credit which is of vital importance in the financing of any company, even though it may occasionally be overlooked by the short-sighted investor to whom the dividend or interest rate paid on securities seems all-important. The cheapest financing is that which is done with a large margin of safety, and companies should be encouraged to maintain a fair surplus over fixed charges and dividends in order to insure sufficient credit for securities to flow freely to investors.

The price at which a security can be sold depends

quite as much upon the margin between the earnings of the company above and beyond that required to pay interest or dividends on the security as upon the rate of interest or dividends actually being paid. The difference between the amount received and that paid out not only provides an opportunity for an increase in dividends later but gives a reserve for contingencies. One electric railway property which we have in mind went as far, for instance, as to spend more than $20,000,000 in twelve years to put its property in excellent physical condition before payment of dividends in 1912. While a property operated under such conditions may not be attractive to those who desire a quick return through stock dividends, it is a much more conservative investment than one dispensing its net income without any thought of future requirements. The ideal situation, of course, is where a railway can pay attractive dividends and still have sufficient surplus for the protection of its corporate interests. We believe that a reasonable margin for such a surplus should be allowed in rate making.

## THE RECEPTION OF THE JOB SEEKER

The attitude that a man takes toward the corporation that employs him is determined very largely by the reception he receives when he first applies for a job. If that reception indicates distrust in his integrity and involves a degradation of his rights as a man the employer need feel no surprise later at sullen behavior and worse. Thus the first essential is that the man who guards the gates of employment should be kindly as well as keen. Yet for years one of our largest electric railways retained in its employment bureau an individual who addressed each applicant as follows: "Damn you, weren't you a conductor on the ———— Street line?" Of course, his object was to catch repeaters off their guard, but he offended ninety-nine innocent men to catch the hundredth wrongdoer. To make matters worse, most of the men had been forewarned of this method of attack, so that little good was accomplished any way. Eventually Mr. Brusque was dismissed. To-day, a different practice is followed. After a group of recruits have passed the school tests they are introduced to an assembly of dispatchers and carhouse superintendents, who generally find no trouble in singling out the men who have been in their service before. The plan as carried out involves no humiliation of innocent men and permits few guilty ones to escape. The company could save a little money, however, if the recruits were inspected before going through the course of instruction. This change would not involve much extra inspection because only a comparatively small number of men who have passed the preliminary physical and oral examinations are rejected in the course of the training on the car platform.

Another humiliating experience for the man who seeks a platform job is to be photographed for the company's rogue's gallery. How many men have been deterred from stealing by this practice? and is the number large enough to offset the outraged feelings of the innocent majority? It is doubtful even whether the demand for three or four personal references does any good, since the crook is the very person who can supply as many references as desired. It may do no harm to ask for references, but one inquiry followed up carefully is worth a dozen followed up by mail and is enough to indicate whether the others are genuine. Incidentally this practice will save time, stationery and postage. What every railway needs in its employment bureau is an experienced reader of character who can "tell the mind's construction in the face." Such men when found cost more than bulldozers, but they are worth the difference.

## ADOPTING THE UNEARNED INCREMENT

From time to time we hear the moss-grown argument that the location of a carhouse or operating station in a residential district tends to depreciate property values. While this may be true of exclusive residential districts in which a railway company could not afford to locate its stations, the experience of the Cleveland Railway most emphatically controverts this argument as a general proposition. Early in its history it adopted the policy of locating the carhouses at points, first, where they were best suited from an operating standpoint, and second, in residential districts where its trainmen could afford to have their homes. While in many instances the location of the site selected was in an undeveloped district, it was but a few years until the surrounding property was cut up into building lots. Although these carhouses and their surroundings might not appeal to the very esthetic they were kept attractive in appearance and as a result did not detract from the desirability of the surrounding property for residential purposes.

Having demonstrated the fallacy of this fogy idea to its entire satisfaction, the management of the railway proceeded to purchase other sites with areas more than ample for its requirements. As the territory developed and the property enhanced in value, portions of these sites were cut off and sold as lots, and in some instances the company realized from these extra lots more than the cost of the original property. At other points property which now has been outgrown and must be thrown on the market has enhanced in value so that the profit will net 1000 per cent. Although this increase has taken from ten to twenty years, it must be borne in mind that in the meantime the property has been serving the full purpose for which it was intended.

At the present time in seeking new sites for carhouses and repair shops, the management is adhering to this policy. As an added incentive to those seeking locations for high-class homes, the new carhouses are being built of a high standard architecturally, and the surrounding grounds are being parked, paved and kept in a neat and clean condition. Already a number of these new sites have appreciated in value, and there can be no doubt but that this company's policy of adopting the "unearned increment," arising in large part from its own improvement, is an excellent one.

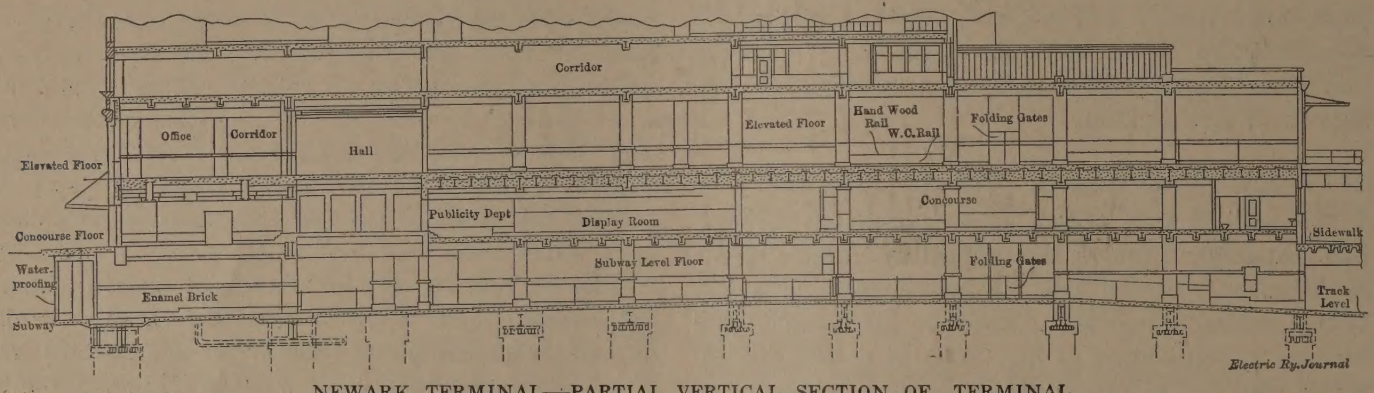
# Progress on the Newark Terminal

In His A. E. R. A. Public Service Company Section Paper, Abstracted Below, Martin Schreiber Gives Interesting Facts Regarding the $5,000,000 Terminal Now Under Construction

As mentioned in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 31, page 1015, Martin Schreiber, engineer of maintenance of way Public Service Railway, gave an illustrated description of the work on the terminal now under construction in Newark at the meeting of the A. E. R. A. Public Service Company section held on Oct. 29. This project was described in a preliminary way in the issue of this paper for Feb. 8, 1913, page 246. The terminal will be a handsome building fronting on Park Place, in the business center of the city. It will be but a step from the intersection of Market and Broad Streets, said to be the second most congested intersection in the country, the maximum rate at which cars are scheduled through it being 532 per hour. As will be remembered from the previous article the new terminal building is a combined terminal for local and interurban cars, and a sales and office building for the several subsidiary companies forming the Public Service Corporation. The terminal tracks are located on a subway or basement floor and on an elevated floor, the ground floor between these being occupied by a concourse and salesrooms.

This terminal project of the Public Service Corporation is unique in the electric railway development of the country, not only on account of its magnitude and the cost involved, but because the operating problems to be solved were diversified and complicated.

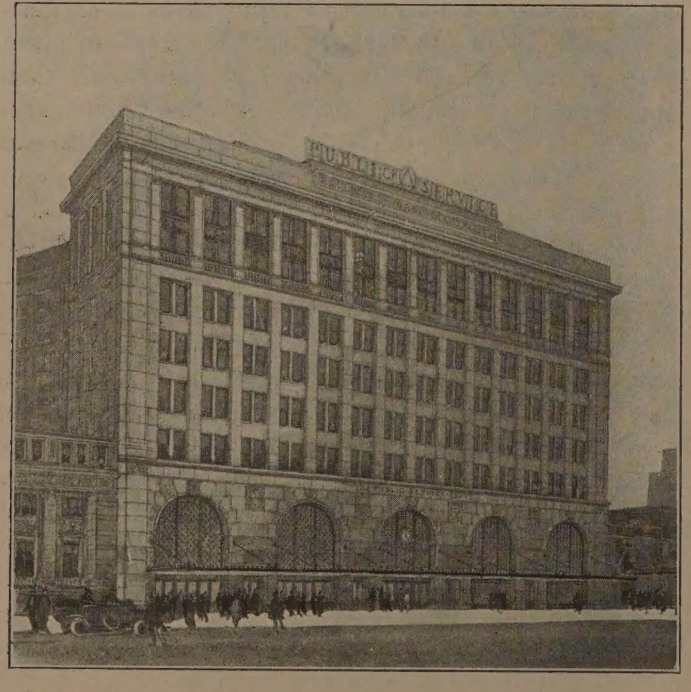
Mr. Schreiber outlined the steps which led up to the present plan, which is the indirect outcome of President T. N. McCarter's association tour of 1912. On this trip Mr. McCarter was impressed by the results obtained from electric railway terminals, particularly in the West. In applying the principle to conditions in Newark he devised the two-train-floor plan with the concourse on the ground level between the two train floors. Before it was possible to carry out the plan it was necessary to secure twenty-seven franchises covering subway, overhead, coincident trackage and extensions in the city. On March 16, 1914, the final stamp of approval was placed upon the plans by the Board of Public Utility Commissioners, fourteen months after the scheme was first introduced to the city authorities. Actual construction was begun on June 14, and it will require two years for the completion of the work.




NEWARK TERMINAL—PARTIAL VERTICAL SECTION OF TERMINAL

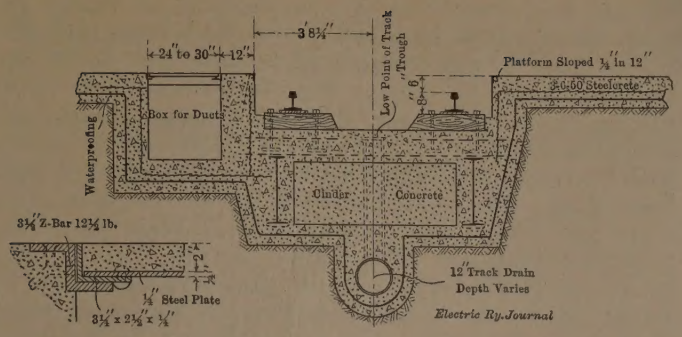
### TRAIN AND CONCOURSE FLOORS IN THE TERMINAL

Cars enter the subway floor from a subway located under Halsey and Cedar Streets and crossing under Broad Street, the construction of which is well advanced. The tracks enter the building at an elevation 21 ft. below the curb line. The ingoing track diverges into two unloading tracks, each 280 ft. long on the southerly side. The loading tracks are three in num-



NEWARK TERMINAL—FRONT OF BUILDING ON PARK PLACE

NEWARK TERMINAL—RECENT PROGRESS PHOTOGRAPH




NEWARK TERMINAL— TRACK SECTION AND CONDUIT COVER DETAIL, TERMINAL BASEMENT

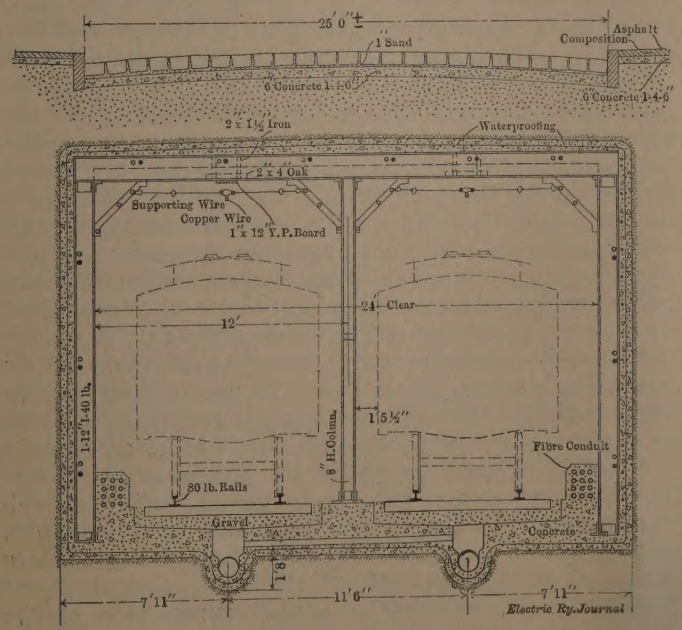
ber, are 225 ft. long, and are located on the northerly side. The total area of the sub-surface terminal is about 104,000 sq. ft. Six stairways for the loading tracks and four for the unloading tracks connect this floor with the concourse above. There is also one stairway on the center platform. On this floor are also spaces for boilers and power plant accessories, building stores, mailing room, etc.

On the elevated train floor are two unloading tracks on the north side, respectively 140 ft. and 170 ft. long, and 190-ft., 180-ft. and 140-ft. unloading tracks on the south side. From the loading platforms there are six stairways leading to the concourse and from the unloading platform there are five stairways. The East Park Street wing on this floor is taken up with coal-conveying machinery for the power plant, and the North Canal Street wing is utilized for division offices and the general employment bureau. The entire area of this train floor is about 70,000 sq. ft.

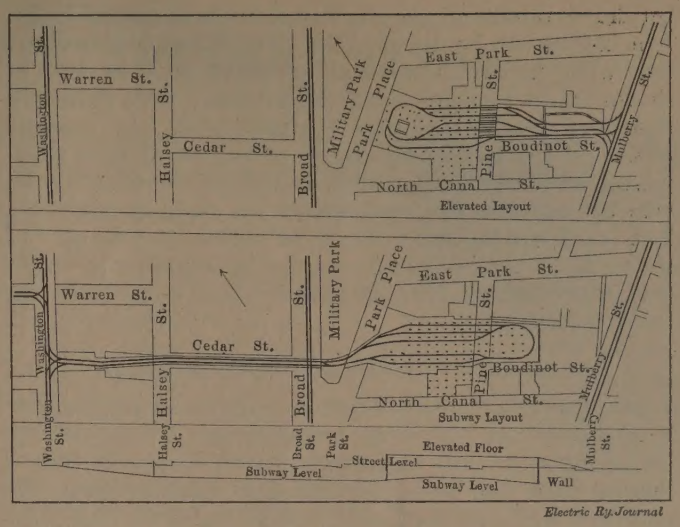
The 70,000 sq. ft. of the concourse floor provide a concourse for the interchange of passengers between the two train floors, salesrooms for the gas and electric companies, waiting rooms, lavatories, booths, etc. On this floor are also the railway school of instruction, the station master's office and the assembly hall checkroom.

### THE OFFICE FLOORS

From the third floor up is the office building, each floor of which has an area of about 30,000 sq. ft. The floor is so planned that the wings are but two rooms deep and all offices have outside light and air. The offices of the railway company will be on the sixth floor; the dining rooms for officers and employees on the




NEWARK TERMINAL—CROSS-SECTION OF SUBWAY




NEWARK TERMINAL — TRACK LAYOUT ON SUBWAY AND ELEVATED TRAIN FLOORS

eighth floor, with kitchen and chef's quarters above; the general assembly room, in which the A. E. R. A. company section and other meetings will be held, on the fourth floor, and the technical library on the seventh floor.

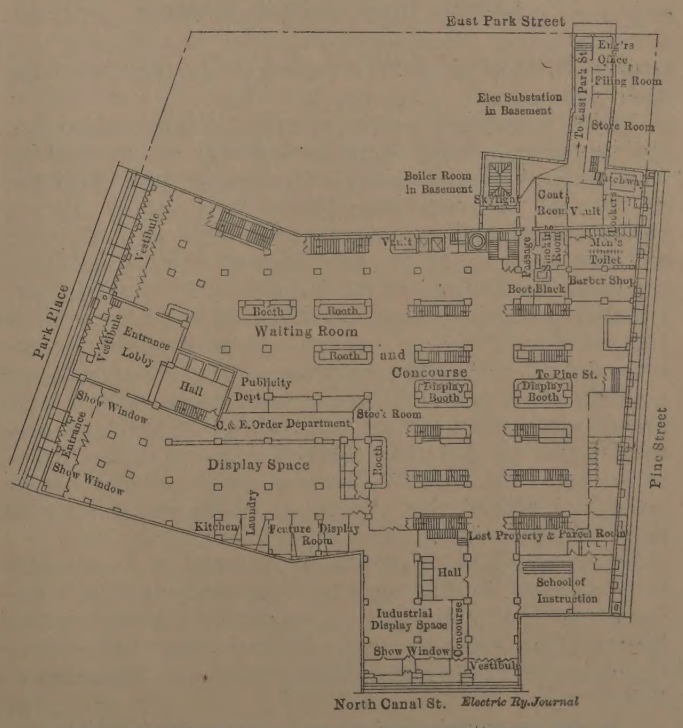
### GENERAL FEATURES OF THE BUILDING AND SITE

The complete floor space will be 451,000 sq. ft. and the building will contain a total of 394 rooms, of which 235 are working rooms and the remainder are general utility rooms. The site contains about three acres, and adjoining real estate has been purchased so that if the neighboring canal is electrified in the future a connection can be made into the terminal.

The excavation necessary is about 100,000 cu. yd., and 92,000 cu. yd. of concrete, 460,000 sq. ft. of waterproofing, 44 miles of conduit and piping and 9000 tons of steel will be required.

### TRACK CONSTRUCTION

The subway track construction outside of the building will consist of 80-lb. T-rail, with Bonzano joints, laid on concrete ties on 2-ft. centers, with 6 in. of ballast.

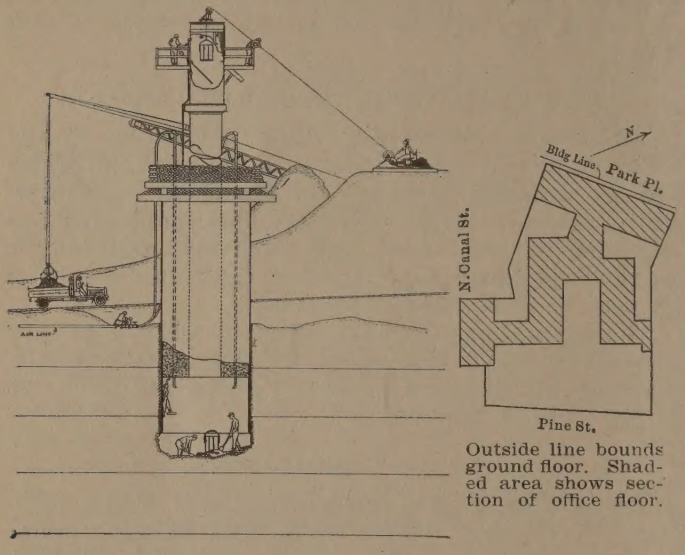



NEWARK TERMINAL—PLAN OF CONCOURSE FLOOR

On the elevated and subway floors in the terminal 90-lb., 7-in. T-rail will be used. This will be fastened to short ties with screw spikes and anchored to concrete, as shown in an accompanying illustration. The rails will rest upon special tie plates equipped with 1-in. cowhair felt. All curves and special work will be of solid manganese construction and this, as well as the other track, will be exposed for convenience in making renewals. The track will be well drained, as shown, to take care of water from cars or platforms, being located well below the latter, which is crowned to shed water into the track spaces.

### Design and Operating Problems

Mr. Schreiber outlined many of the unusual problems involved in the terminal undertaking. These covered all branches of the engineering profession, so that a special staff had to be organized to handle them. An assistant engineer was assigned to supervise the work under the engineer of maintenance of way. A corps comprising an architect, a foundation engineer, a structural engineer, a heating and ventilating engineer and an electrical engineer was organized. Jacobs & Davis, of New York, were retained as consulting engineers, and




NEWARK TERMINAL — DIAGRAMMATIC CROSS-SECTION OF CAISSON; FLOOR SECTION DIAGRAM

George B. Post & Sons, of New York, as consulting architects.

As the foundations were of unusual importance in a building which must carry loaded cars on an elevated floor without producing serious vibration, the character of the soil was carefully studied in advance. In the borings, sand and clay were encountered at 4 ft., sand and fine stone at 18 ft., fine sand at 21 ft., fine moist sand and water level at 26 ft., quicksand at 35 ft. and red shale in horizontal layers at 53 2/3 ft. After considering a plan involving separate sets of columns for the train floor and the office building, it was abandoned and a single set of columns resting on bedrock, with a well-braced, deep floor system for train platforms and concourse, was decided upon. The reasons for this selection were: first, that heavy floors would assist in eliminating noise, and, second, that clearances among columns had to be provided for the cars on train floors.

An eccentric arrangement of columns was necessary on account of the clearance feature, rendering the whole design difficult and dictating many of the design features. The columns were located with the aid of templates of the cars to allow a minimum clearance of 1 ft.

The arrangement of stairways was made with a view to enabling passengers to use the proper ones in reaching the cars desired so that no crossing of tracks on train floors will be necessary. The climb from the concourse floor to the elevated train floor will be 17 ft. and that from the subway floor to the concourse floor will be 18 ft., the subway floor track being crowned to minimize climbing. These heights compare favorably with 32 ft. in the Hudson River tube at Fulton Street, New York; 30 ft. at the 180th Street elevated station, New York; 58 ft. from subway train platform to bridge platform at Brooklyn Bridge, New York; 36 ft. at Ninety-ninth Street elevated station, New York; 44 ft. from the Pennsylvania Railroad train platform to the street, New York terminal; 43 ft. from the subway platform to the street, Long Island Railroad, New York terminal.

The general layout of the terminal was designed to care for 400 cars per hour, or say 50,000 persons going in both directions, doubling the capacity for handling passengers in the business district of Newark.

## Safety in Street Railway Work

Dr. W. H. Tolman, director of the American Museum of Safety, discussed the topic of "Safety as Applied to Street Railway Work" at a meeting of the New England Street Railway Club on Nov. 19. A large number of lantern slides were shown.

According to Dr. Tolman,a new figure has appeared in the industrial field—the safety engineer—whose work lies in the direction of reducing accidents in industrial, manufacturing and transportation enterprises. A museum of safety has been in existence in New York for some time, and one has recently been established in Boston by the Massachusetts Industrial Accident Board. From such a museum safety men can go forth to explain safety methods to manufacturers and workers. An important feature of this campaign is in the public schools, and in New York, Brooklyn and Buffalo more than 500,000 children have been reached in this way. Excellent work has also been done by the Public Service Railway, New Jersey, which is now beginning its fourth year of educational work.

An address on safety work was also presented by Dr. Tolman at a meeting on Nov. 10 of the Hudson & Manhattan Railroad Athletic Association. President Fisk was also a speaker at this meeting.

## The Pennsylvania System's Exhibit at the Panama-Pacific Exposition

The Pennsylvania System exhibit at Chicago was historical; at St. Louis scientific; at the Panama-Pacific International Exposition in 1915 the exhibit will be practical and popular and will serve to bring before the eyes of the thousands of people a true educational picture of density of population, traffic and industry served by the Pennsylvania System. The exhibit will consist of models of New York City and surroundings, with the Pennsylvania System from the Mississippi River to the Atlantic Ocean and from Duluth to Norfolk; and two railroad stations, the Union Station at Washington and the proposed Union Station at Chicago. A unique motion picture auditorium of two Pennsylvania all-steel passenger coaches, wherein will be shown views of various journeys from the Western gateways of the Pennsylvania System to New York, will also be on exhibit.

The exhibit will be under the direction of George D. Dixon, vice-president in charge of traffic Pennsylvania Lines East of Pittsburgh, and D. T. McCabe, vice-president in charge of traffic Pennsylvania Lines West of Pittsburgh. H. T. Wilkins, special agent traffic department, has had direct supervision of the preparation of the exhibit and he will also supervise its installation and display.

# Meeting of Central Electric Railway Association

The Autumn Meeting Which Was Held in Fort Wayne on Nov. 19-20, Was Reported in Part in Last Week's Issue—An Account of the Proceedings at the Second Day's Session Is Published, Together with Papers on Oxy-Acetylene Welding and on Interurban Headlights

In last week's issue of the ELECTRIC RAILWAY JOURNAL an account of the first sessions of the Fort Wayne meeting of the Central Electric Railway Association was published, and the last session held on Friday, Nov. 20, is reported in the following paragraphs. The meeting on Friday opened with President Schneider in the chair and more than eighty members in attendance. At a business session which was held prior to taking up the regular program, the association was informed that several boat lines operating on the lakes out of Cleveland, Ohio, had requested joint rates with the electric lines touching lake points. Upon motion, W. S. Whitney, general freight and passenger agent, Ohio Electric Railway, John F. Keys, general passenger agent, Detroit United Railway and President Schneider were appointed a committee to investigate the desirability of granting the request.

Following the transaction of business the regular program was opened with a paper by J. F. Layng, engineer of the General Electric Company, entitled "Selection of Railway Equipment." This was published in abstract in the Nov. 21 issue. W. E. Rolston, electrical engineer Chicago, Lake Shore & South Bend Railway, opened the discussion with an inquiry regarding the economical motor load factor. In response Mr. Layng stated that there were too many variables to permit its determination. He said that one must assume the worst condition on any line or any system and select a motor of sufficient capacity to do the work. To determine the worst condition, however, actual tests should be made to obtain best results. After these data are obtained the railway company's engineer should not include a factor of safety because all manufacturers take this into consideration in selecting a design to meet the conditions presented. If the safety factor is not included the first cost is materially decreased without affecting maintenance.

In reply to another inquiry Mr. Layng stated that the motor mounting shown in Figs. 5, 6, 7 and 8 of the diagram accompanying his paper, were not recommended by the manufacturers, but represented methods of mounting in actual service. This diagram was published on page 1159 of the ELECTRIC RAILWAY JOURNAL for Nov. 21. G. H. Kelsay, superintendent of power, Union Traction Company of Indiana, inquired regarding the current consumption of the motor mountings shown in Figs. 2, 3 and 4 as compared with that shown in Fig. 12 of the same diagram. In response Mr. Layng stated that the power saving obtained by the use of maximum traction trucks for two-motor equipments as compared with standard trucks was practically negligible. The efficiency of modern motors varied from 84 per cent to 88 per cent under full load, and there was little to be gained by the slight change in size necessary when a two-motor equipment was used instead of a four-motor equipment. The factor governing the selection of motor equipment should be wheel slippage rather than motor efficiency. The combined gear efficiency of a four-motor equipment also enters and tests have indicated that it is about the same as that for a two-motor equipment. On long-haul interurban lines wheel slippage was negligible. In referring again to the question of load factor, Mr. Layng stated that better economy could be obtained with a greater range of speed points in the control equipment.

R. N. Hemming, superintendent of motive power, Union Traction Company of Indiana, raised the question of whether it was more economical in train operation to mount motors on trail cars or to increase the size of the motor-car equipments, and Mr. Layng replied that the maximum economy would be obtained with trailers operated without motors. In explanation, he stated that in either case it would be necessary to have practically the same control equipment on both cars and that the application of motors to trail cars was purely a problem to be decided by the question of weight. It was also necessary to consider the question of dead mileage in operation. He suggested that the trailer weight could be further reduced by equipping them only with air brakes connected by train line to a compressor on the motor car. He stated also that motors which were suitable for trailer operation were also good for local service, and that this was a point deserving of serious consideration, since it was almost impossible to divorce local and limited service on most interurban lines. In view of this condition electrical equipment must be so selected as to be flexible enough to meet any operating condition. Following the discussion Mr. Layng exhibited some lantern slides showing the historical development of railway motors.

J. W. Esterline, president and general manager of the Esterline Company, next read a paper entitled "Interurban Headlights." This appears elsewhere in abstract form. Following his comprehensive treatment of this subject, the speaker stated that he had collected data to determine the cost of operating arc lamps and had found in a test of 5000 samples that the average power consumption for 4-amp, 550-volt lamps had been 2.25 kw per arc for a six-hour period. Figuring the difference in the cost of this energy as compared with that consumed by 100-watt incandescent lamps, he found that it represented 6 per cent on an investment of $6,000,000. The cost of maintaining incandescent headlights amounted to little more than the cost of replacing bulbs. To obtain the maximum life, however, it was necessary to select a lamp voltage which would conform to the maximum trolley voltage condition.

In reply to an inquiry regarding the fog penetrating qualities of the "Golden Glow" headlamp, the speaker stated that it was entirely due to the rate of vibration of the rays. The blue and violet rays, representing those with a high rate of vibration, were absorbed during foggy or rainy weather, while those of a longer wave length were not turned back. The question of short and long lengths of light waves was analogous to the short and long lengths of sound waves. For example, extremely high-pitched whistles did not carry as far as low-pitched whistles.

Mr. Hemming, of the Union Traction Company of Indiana, then spoke of the relative advantages of mounting headlamps on the hood or on the dash. Among other things he stated that it was costing his road approximately $8.10 per lamp per year for maintenance. In a recent test he found that he could see slightly farther with the headlamp in the hood than he could with it mounted on the dash. He also stated that he believed it

was easier on the motorman's eyes to look under the rays of a lamp mounted in the hood than through the rays of a lamp mounted on the dash.

In discussing some of these points Mr. Esterline stated that the problem was purely one of eye efficiency and that it alone should determine the location of the lamp. It was also important that tests of this kind be made by continuous observation rather than by an observer whose eyes had not accustomed themselves to the conditions under which a motorman must operate his car at night. It was also brought out that the length of vision depended both on the reflector and the tilting of the lens. By reference to a diagram it was shown that eye efficiency increased with the angle of reflection, hence this in a way might account for the better results obtained by mounting the headlamps in the hood rather than on the dash.

H. S. Smith, engineer of the Prest-O-Lite Company, next read a paper entitled "Oxy-acetylene Welding." This paper appears below in abstract form. Various points relating to the application of this method of welding were brought out by Messrs. Cochran of the Ohio Electric Railway, and Hemming, Mitchell and Kelsay of the Union Traction Company of Indiana. It was stated that bonds with 2½-in. terminals were welded to the rail in three and one-half minutes, with a total labor cost of 10 cents. It was stated that the successful accomplishment of track welding and repairs was simply a question of determining the nature of filling-in material which would give the best result. Mr. Mitchell stated that he believed there was a good field for an iron bond or welded joint which would replace the present method of bonding. Mr. Cochran emphasized the fact that the bonding question was a very important one at this time, since copper bonds were costing approximately 40 cents per pound. If scrap copper could be used for this purpose instead of new, it would afford a means of making considerable saving. Following this discussion President Schneider announced that the annual meeting of the association would be held in Indianapolis, Feb. 25 and 26, 1915, the place of meeting to be decided upon by the committee having the convention arrangements in charge.

## OXY-ACETYLENE WELDING

BY H. S. SMITH, THE PREST-O-LITE COMPANY, INDIANAPOLIS, IND.

Apart from the vital question of cost it is generally conceded that fusion produced by the burning of gases is preferable, for the purpose of welding, to the electric process. This is true over a wide range of work for the following reasons: When welding with the electric arc, an intense heat is concentrated at a single point, whereas with gas welding the heat of the flame can be brought at will to bear on the work surrounding the part to be welded, making it possible gradually to attain the desired welding heat. With electric-arc welding the light produced is so intense that the use of very dark glasses by the operator is imperative. This in itself makes for uncertain results, because the operator cannot see his work clearly. Again, unsteadiness on the part of the workman may cause an arc to be struck unintentionally, resulting in fusion or addition of metal where it is not desired. The electric arc is formed at the expense of atmospheric oxygen, and this indicates the possibility of chemical changes of an oxidizing character taking place in the molten metal, whereas with the gas process the welded part is always protected from the atmospheric oxygen by a shield of the products of combustion. Electric welding is suitable for filling in or welding comparatively simple parts but it cannot be used for complicated work, as is the case with the gas process. Probably the chief objection to electric welding is the fact that it is almost impossible to perform any subsequent treatment of the welded part. This is quite simple with the gas process, where the area surrounding the weld and the weld itself can be gradually annealed, thus removing internal strains and taking from the welded portion its hard and brittle character. Please do not understand me as being severely critical of the electric process. Electric welding has a large field wherein it can be employed advantageously and with better results than can be obtained with other methods of welding.

Experience with the oxy-acetylene welding process has shown that best results are arrived at when acetylene is delivered at the burner under pressure. In order to do this it is necessary to employ pressure generators, which have some serious objections, or to employ acetylene in dissolved form. In some cases the injector type of blowpipe is used. This enables acetylene to be supplied from generators which generate under low pressure, using excess pressure on the oxygen supply to provide power to suck in the acetylene and deliver the mixture of gas to the blowpipe nozzle at a suitable pressure. One volume of acetylene ($C_2H_2$) requires, theoretically, 2.5 volumes of oxygen to burn it to carbon dioxide and steam, but in actual practice it is found that, when both gases are delivered to the blowpipe under pressure, only 1.1 volumes of oxygen are required for each volume of acetylene. Injector-type blowpipes require 1.3 volumes to 1.5 volumes of oxygen to one of acetylene.

Acetylene, on issuing from the nozzle of a blowpipe into the flame, immediately splits up into its two constituents, carbon and hydrogen. The carbon burns with the oxygen supplied through the blowpipe to form carbon monoxide. It is this combustion that produces the white cone of the flame. The carbon monoxide later, in the close vicinity of the white cone, burns to carbon dioxide. The hydrogen contained in the acetylene cannot combine with oxygen at or in close vicinity to the white-cone flame, as the temperature at that point is about 6300 deg. Fahr. This is far beyond the dissociation temperature of steam, which is about 4000 deg. Consequently, the hydrogen passes away and only combines with the oxygen of the air after it has passed away from the hot part of the welding flame. The result is a zone of more or less free hydrogen surrounding the welding flame, and this is highly advantageous, as it tends to confine the heat and prevent oxidation of the metal.

For commercial purposes oxygen is manufactured either by what is known as the liquid-air process or the electrolytic process and it can be obtained comparatively pure from either class of plant. Any impurity in oxygen manufactured by the liquid air process is mainly nitrogen, and, while freedom from nitrogen is desirable, a slight percentage is not fatal to good welding of iron or steel. However, should the percentage of the nitrogen impurity exceed 1½ per cent the welds are apt to be porous, because of the absorption of the nitrogen by the molten metal. The purest possible oxygen should be procured for welding aluminum, copper or brass, as at high temperatures these metals have strong affinity for nitrogen. In the case of oxygen manufactured by the electrolytic process the only impurity will be hydrogen. Excess hydrogen will tend to reduce the flame temperature, but oxygen manufactured by this process is, as a rule, in a comparatively pure state.

Acetylene as employed for welding purposes to-day can be generated by the user at or near his shops by treating calcium carbide with water, or it can be procured in cylinders in the form of dissolved acetylene. At 30-lb. pressure and over acetylene in its free state

is explosive. Between 15-lb. and 30-lb. pressure its action is somewhat uncertain. Therefore where users desire to have acetylene under pressure it is probably best to use dissolved acetylene. This is washed, dried and purified acetylene gas compressed into ordinary steel bottles or cylinders that have been previously filled with some porous substance, such as asbestos or charcoal, which is then saturated with acetone. Acetone is a liquid hydrocarbon that has the peculiar property of absorbing acetylene, and an acetone cylinder of 2 cu. ft. capacity will hold 20 cu. ft. of acetylene at 1-atmosphere pressure or 300 cu. ft. at 15-atmospheres pressure.

The strength of a weld made by the oxy-acetylene process is, as a rule, less than that of the original metal. A claim of 100 per cent weld strength is unsupportable. Practice has shown that for thin sheets up to say 3/16 in. in thickness, one can get a weld strength of 95 per cent, but that this figure falls to 85 per cent for 1-in. plates. However, where welding has to be carried out, there is generally no objection to adding a fillet of metal along the joint or using high-grade filling-in metal. In such cases the welded joint can be made to equal or exceed the strength of the rest of the work.

In order to insure successful results it is necessary that the work be carefully prepared before welding. The parts to be welded must be free from rust and grease. Sections over ⅛ in. in thickness must be beveled before welding. For thick work beveling from both sides is advantageous if feasible. Whenever welding is performed, internal strains are invariably set up in the metal due to expansion and contraction, and, in the case of cast iron, the tendency to crack will be greatly increased if the cooling of the metal after fusion is rapid or irregular. In all cases care should be taken in the selection of the proper size of blowpipe tip to be used on any particular job. As large a blowpipe tip as is possible should be used so that the metal is kept in the molten state as short a time as possible.

With those unacquainted with the process, the welding of cast iron appears to be more difficult to accomplish than work on steel or wrought iron, but such is not the case. Since it is generally necessary to work a weld in cast iron, it is indispensable that the line of welding should be constituted of the soft gray iron that contains graphitic carbon. Slow cooling or reheating after the welding is completed tends to bring about the precipitation of graphitic carbon and the production of a softer material. It is found that by employing silicon in the filling rod in the form of ferro-silicon, the iron combines with the silicon in preference to the carbon, allowing the carbon to take the form of graphite and thus facilitate the formation of gray iron. The presence of manganese has exactly the opposite effect. In order to get good workable welds there must be slow cooling after the welding is completed. The filling rod must contain a percentage of silicon, and there must be no manganese present.

The welding point of ordinary cast iron is lower than that of iron or mild steel and lower than the melting point of iron oxide; therefore, if any oxides are formed during the welding process they cannot be melted and blown away by the flame, as is the case where iron or steel is fused. Therefore, when welding cast iron, it is necessary to employ some flux to break down any oxides that are formed.

For cutting metals a special blowpipe is provided consisting of any oxy-acetylene blowpipe fitted with a central or following jet for oxygen only. The work that has to be cut is first heated up by means of the oxy-acetylene jet, and, as soon as it is raised to a temperature at which oxygen will ignite it, the separate oxygen jet is turned on and the metal at once burns away very rapidly. The oxygen simply has sufficient pressure behind it to blow away the oxide as it is formed, with the result that a clean, narrow cut can be made through plates up to 12 in. in thickness and over. The speed at which this work can be done is high, varying from 100 ft. per hour for metal ¼ in. thick to 12 ft. per hour for metal 12 in. thick, the oxygen consumed in this process varying from 0.50 cu. ft. per lineal foot run in ¼-in. plates to 50 cu. ft. in 12-in. plates. As an instance of the use to which the oxygen cutting tool can be put I might mention the cutting off of the heads of bolts and rivets which hold the coupler anchorage between the steel sills of 80,000-lb. capacity freight cars. The job usually takes three men ten hours. One man with a cutting torch can do it in forty-five minutes.

There is another important application of oxy-acetylene in the electric railway field, and this is the welding of copper bonds and rails. The Twin City Rapid Transit Company employs a twin cable bond with cast terminals, and it is claimed that a gang of three men can weld seventy-five of these bonds per day. The gas consumption is 2 ft. of acetylene and approximately 2 ft. of oxygen per bond. It has been suggested that the copper of the bond is oxidized when this process of applying it is adopted, but practice has shown that this is not the case if the weld is properly and rapidly made, special attention being taken to see that the welding flame is a neutral one. The oxy-acetylene blowpipe can also be employed for reapplying the solder type of bonds which have come loose.

## INTERURBAN HEADLIGHTS

BY J. W. ESTERLINE, THE ESTERLINE COMPANY, INDIANAPOLIS

We have in our experience in the headlight business found a great many men who are inclined to judge the qualities of a headlight by its intrinsic brilliancy. The more blinding, dazzling and the more powerful its appearance at night, without any reference to its effect upon visibility and the efficiency of the eye, the better the headlight is believed to be, and many of our laws have been based upon a similar conception of the question of illumination.

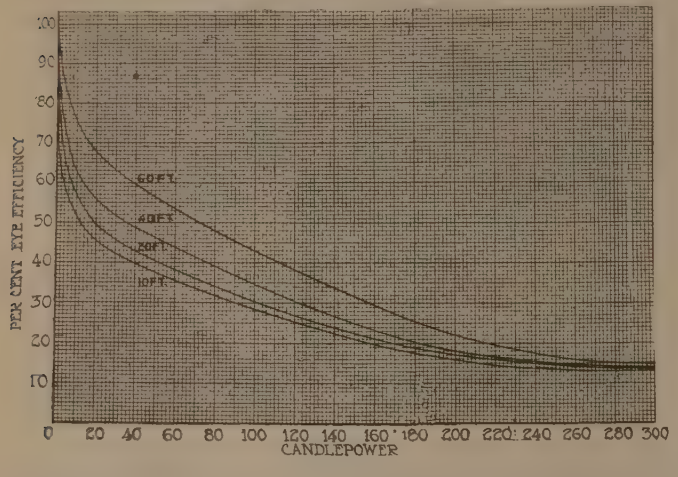
When we look at the human eye we see through the clear, transparent cornea a circular colored portion, the iris. In the center of the iris is an opening, the pupil. This opening has the property of enlarging itself or contracting, according to the amount of light striking the eye. Thus, when we pass from a dark room into a brilliantly-lighted room, the pupil almost instantly contracts. It is significant that the contraction in passing from darkness into bright light is accomplished almost instantly, whereas the enlargement in passing from bright light into darkness is accomplished comparatively slowly.

Close behind the pupil in the human eye lies the crystalline lens, whose function is, of course, similar to that of a lens in a camera. There is, however, this important difference in operation. The clearness of the image formed by the lens of a camera is maintained, whether the object is far or near, by changing the distance between the lens and the ground glass, or sensitized plate. Obviously, in the human eye such changes cannot be made. The clear focus of near or distant objects is therefore accomplished by changes in the curvature of the crystalline lens. Around the outside of the lens runs a ligament, and this ligament is attached to the ciliary muscle. By contraction or relaxation of the ciliary muscle a greater or lesser curvature of the lens is accomplished.

The crystalline lens is non-achromatic. When light having rays of all colors, as in the case of white light, is reflected from the object to the eye, the blue and violet rays are brought to a focus in front of the retina, and the red rays directed toward an imaginary focus behind the retina. The red, blue and violet rays serve, therefore, to blur the otherwise sharp image formed by the yellow rays on the retina.

Now, when the object is illuminated by monochromatic light, that is, by a light of a single color, the rays are brought to a sharp focus on the retina, and there is no blurring effect. In other words, the non-achromatic lens can adapt itself to any one color of light, but in the presence of light of all colors, combined in approximately the proportion of white light, it adapts itself to the yellow rays.

Research has conclusively established that monochromatic light enables detail to be distinctly seen at a lower intensity of illumination than when the object is viewed by white light. It has also been established that different colors of monochromatic light vary in their power to disclose detail. The power of disclosing maximum detail with minimum illumination seems to be




CURVES SHOWING RELATION BETWEEN EYE EFFICIENCY AND CANDLE-POWER OF LIGHT AT VARIOUS DISTANCES

possessed by a yellowish-green color, and we can see more distinctly with the same light, or equally distinctly with less illumination, if that light be of a greenish-yellow color.

In considering the question of headlights, it must be borne in mind that the human eye when constantly subjected to an intense white light reflected from the road quickly loses its efficiency. In other words, the brilliancy of the light itself reflected back into the eye of the motorman soon lowers the efficiency of the eye to a point where the ability to see is less than it would be if the light were less brilliant. The lowering of the eye efficiency depends upon the total amount of light which enters the eye, and upon the angle with the line of vision at which each integral portion of light enters the eye.

The curves in the accompanying cut show the relation between the efficiency of the human eye and the intensity of light entering the eye along the line of vision. It will be observed that a very small intensity of light entering the eye along the line of vision materially cuts down the efficiency of the eye. When the intensity of the beam reaches 300 cp the efficiency has been tremendously reduced. These curves show clearly why, when a beam of several thousand candle-power shines directly into the eye, it is impossible for the driver of a car to see anything in his path, since an increase of from 20 cp even to 300 cp in the beam of light entering the eye lowers the efficiency from 70 per cent to 12 per cent. The curves also show that the efficiency of the eye is very little affected by the distance of the light source or light reflecting object from the eye.

Dr. C. P. Steinmetz has said: "The light which enters the eye is converted into heat, and if its power is considerable, it may be harmful or even destructive, causing inflammation or burns. This harmful effect is, assuming the same amount of visibility, greatest for those frequencies of light which have the lowest visibility or highest power equivalent. Hence, green and yellowish-green lights are the least harmful, the least irritating to the eye, as they represent the least power." The United States bureau of standards also recommends a yellow light as causing the least fatigue. The American Railway Master Mechanics' Association's committee on headlights reported that there was no apparent difference in the ability to see dummies with a given intensity of light, whether the source was oil, acetylene or incandescent lamps. However, with an arc lamp having 60,000 apparent beam candle-power, a dark dummy could be seen only 557 ft. away, but calculating from the visibility curve for oil, acetylene and incandescent lamps, the dummy should have been seen at the same distance with an apparent beam candle-power of only about 14,000. This effect could be attributed only to the predominance of short violet waves in the arc rays to which the eye did not readily respond.

In the type of headlight manufactured by the company with which the writer is associated, non-blinding effect and increased visuality is secured by altering the quality of the light given by the incandescent lamp, and by this means the coloring and irritating effects are greatly reduced without appreciably altering the illuminating qualities.

The colored glass lens that is used subtracts from the beam of light given by the incandescent bulb all of the rays above the green, i.e., the violet and the blue, and passes all of those colors below it, so that while the light given by the filament of the lamp itself is a brilliant white, the beam of light from the headlight is a greenish-yellow. Because of the fact that a beam of light from this type of lamp is soft, mellow and free from glare, it does not, at first sight, impress one as being as powerful as the striking, brilliant, dazzling rays from an arc lamp, but riding behind the lamp one is soon impressed with the detail with which objects can be observed, the entire freedom from tiring of the eyes, due to the quality and the steadiness of the light.

With a polished glass mirror reflector and a lamp of 100 watts burned at normal efficiency, these headlights enable the observer to distinguish ordinary objects at a distance of from 900 ft. to 1200 ft. without difficulty, whereas, objects of a light color, such as poles, station markers and persons in light clothing, can be seen from 1200 ft. to 1500 ft. On account of the variation of the intensity of the light with the voltage, the best results are obtained by operating the lamp with other tungsten bulbs. However, quite a number of roads maintaining a fairly uniform trolley voltage, say from 450 to 600, are using these headlights in series with resistances.

When operated in series with the tungsten lamps in the car, with the headlight bulb burning at normal intensity at normal trolley voltage, the operation of the headlight is very satisfactory even with fluctuating trolley voltages, and on numerous occasions tests have shown that it continues to give light at voltages at which arc lamps refuse to operate. On the steadiness of the light from an incandescent headlight little need be said, as the variation in illumination is limited to the fluctuation caused by the changes in trolley volt-

age, and there is entire absence of the constant flickering and shifting of the light, so common in an arc lamp.

In this type of headlight an incandescent lamp with a spherical bulb and a concentrated type of filament is used, since only that part of the filament at the focal center of the parabola is effective in producing the beam, the average life of this type of bulb when burned continuously at normal voltage being from 450 hours to 500 hours. The life is greatly increased with a slight reduction in voltage, and it is, therefore, important that the lamp is not burned above its normal rating.

## Safety on Illinois Railways

### Members of the Illinois Electric Railways Association Describe Their Methods

At the meeting of the Illinois Electric Railways Association held at the Auditorium Hotel, Chicago, Nov. 21, with President B. I. Budd in the chair, John Mallon, assistant general superintendent of transportation Chicago Elevated Railways, gave an illustrated talk on the safety and first-aid methods employed by his company. The speaker showed a number of lantern slides which are exhibited at the meetings of employees to illustrate the right and wrong ways of performing routine duties, following which a set of slides, designed to show the public how to avoid accidents, also was exhibited. He stated that Dr. H. A. Fisher, the company's surgeon, has a special squad of five trainmen who give demonstrations of first-aid work at points on the Chicago elevated system. They devote special instruction to local squads in each division so that, in turn, these squads may become proficient and themselves disseminate first-aid information. To encourage employees' interest in the "safety first" movement buttons are distributed among them, a monthly bulletin is issued giving safety hints and the men are called together at monthly meetings, when pictures are shown bearing on their work and offering suggestions for greater safety to themselves and to the public. First-aid boxes have been located about the elevated system where they may be reached readily in case of accidents.

In the discussion of "safety first" methods, which followed Mr. Mallon's talk, J. R. Blackhall, general manager Chicago & Joliet Electric Railway, Joliet, Ill., described his local campaign, in which "safety first" moving-picture films were exhibited at local theaters. With the co-operation of the superintendent various schools were closed, and the railway provided free transportation for the children to the center of the city where the picture shows are given. A number of interesting letters of appreciation have been received from members of these youthful audiences. Blotters bearing "safety first" advice also were distributed in the schools and business houses, and suggestions for the prevention of accidents were set forth in letters to local business men and to all owners of automobiles.

H. B. Adams, claim agent Aurora, Elgin & Chicago Railroad, said that about 80 per cent of all accidents were due to carelessness on the part of the employees or the public, while for the remaining 20 per cent the company was to blame. Mr. Adams described his campaign, in which he made "safety first" talks to school children, college students and members of local clubs. The net result of this was a reduction of about 50 per cent in the number of accidents. He also laid particular stress upon the value of interesting the children and in getting them to spread among their elders the maxim "Get on with the right hand; get off with the left."

F. E. Fisher, general superintendent Chicago, Ottawa & Peoria Railway, explained that the safety crusade must reach all branches of electric railway operations, and introduced W. F. Carr, his engineer of maintenance of way and of overhead construction, who furnished a number of safety hints. The public must be systematically educated, said Mr. Carr, and while advertising and printed text matter are effective, the most valuable instruction will be that given individually by employees; in the same way regulations contained in the book of rules are likely to be found not effective unless discussed and the points at issue emphasized. All accidents occurring on the Chicago, Ottawa & Peoria Railway are listed and described in detail for record. A merit and demerit system is also maintained, by which the meritorious acts and deeds of thoughtfulness in accident prevention are rewarded, while carelessness is correspondingly penalized. Mr. Carr advised against the policy of discharging men who have made mistakes, for, he declared, a serious accident for which a man is to blame leaves an indelible impression upon his mind and makes him a more careful and thoughtful operative in the future. If, on the other hand, the man is discharged, his place must be given to a new man, and it is possible that the lesson of safety may have to be learned all over again.

B. I. Budd, president Chicago Elevated Railways, declared that while it is easy to start "safety first" systems, the difficulty lies in following them up and getting the results which are so essential. He recommended the practice of giving credit for meritorious acts, although he cited an instance to show that unless care is taken this practice can be abused.

Marshall P. Sampsell, president Central Illinois Traction Company, Mattoon, Ill., stated that the safety department of a utility is one of the most important divisions of its work, and he urged that, if necessary to make retrenchments, other work be curtailed or dispensed with before that of the safety department. Mr. Sampsell recommended the appointment of a special safety agent to be responsible directly to the president of the corporation and urged that the latter official give due attention to the human side involved in the suggestions of his safety inspector.

E. J. Blair, electrical engineer Chicago Elevated Railways, described the attention being paid to the proper lighting of railroad yards by steam railroad companies. He suggested that this topic be considered thoroughly by the electric railways, which, better than any other utilities perhaps, are equipped to provide their yard facilities with cheap and efficient illumination.

Just before adjourning the meeting President Budd called attention to the work of scrap experts who are now engaged in campaigns among electric railways for the more advantageous disposal of scrap and refuse material. Analyses of the methods of collection and sale of scrap, said Mr. Budd, show that this material, extremely valuable in the aggregate, has been handled loosely and sold too cheaply. Owing to the incompleteness of the classification given it, the prices received fall far short of those which should be obtained. During present business conditions, President Budd urged a closer attention to the disposal of scrap material. Following the session the regular association luncheon was held in a room adjoining the convention hall. About fifty delegates were present at the meeting.

The trustees of the Rockefeller Foundation have decided to inaugurate an extensive investigation into the problem of industrial relations, and have secured the services of W. L. Mackenzie King, C. M. G., former Minister of Labor for Canada, as director of the investigation.

# Meeting of American Railway Association

**Proceedings and Reports of Committees at the Autumn Session in Chicago**

The autumn session of the American Railway Association was held at the Blackstone Hotel, Chicago, Ill., on Wednesday, Nov. 18. There were present 210 members, represented by 180 delegates. At the opening of the meeting the executive committee reported that its attention had been called to the use of illuminated electric signs on the rear of passenger trains, and in connection therewith the committee adopted the following resolution: "The American Railway Association disapproves of the use of electric illuminated signs on the rear of passenger trains, by reason of the effect they have of concealing the essential indications of the standard marker signals and also because they absorb the light of other signals and have a tendency to divert the attention of the employees, whose duty it is to observe the signals which are essential in railway operation."

## Changes in Standard Time Opposed

The committee on standard time presented a report covering its consideration of this subject, and resolutions were adopted by the association to the effect that it was the sense of the American Railway Association that the uniform standard time system, which had been in force since 1883, had proved its practicability and utility, and should be maintained in its integrity, and no essential departure should be made therefrom; and that when any proposition should be made for a change in the standard time of the whole or any part of a railway line a member of the American Railway Association the subject should be referred to the executive committee for consideration; and that the American Railway Association urged upon the roads which had recently adopted eastern time in place of central time that they return to the use of the uniform standard at the earliest practicable date.

The committee on transportation reported that it had now practically completed the revision of the standard code of train rules for single and double track, rules governing the movement of trains with the current of traffic on two or more tracks by means of block signals, rules governing the movement of trains against the current of traffic on two or more tracks by means of block signals, and additional rules for three or more tracks. Before presenting this to the association for adoption, however, it desired to give each member an opportunity to examine and formally to submit its criticism of the rules. As a result of the suggestions which it hoped to receive in reply, the committee expected to be able to present a complete report to the association at the session in May, 1915.

## Standard Freight-Car Dimensions

The committee on maintenance announced the result of the letter ballot, ordered at the previous session of the association, relative to the standard inside dimensions of box cars, as follows: (1) That the present standard inside dimensions of box cars, as adopted by the association on October 23, 1901, viz., 36 ft. in length, 8 ft. 6 in. in width and 8 ft. in height, should be adhered to, except in the construction of special equipment, such as automobile cars; (2) That special equipment should not exceed the inside dimensions of 40 ft. 6 in. in length, 8 ft. 6 in. in width and 9 ft. in height, with maximum outside dimensions of 9 ft. 2 in. in width at 13 ft. above the top of the rail; (3) That the Master Car Builders' Association be requested at the earliest practicable moment to design and adopt a standard frame for closed cars in accordance with the present standard inside dimensions of box cars.

Although a majority of the memberships of the association voted in favor of the three resolutions, the number of freight cars represented by such memberships was less than two-thirds of the freight cars owned and controlled by the members of the association. The resolutions therefore were not adopted.

The committee also presented a summary and compilation of data collected of clearances for switch stands, signal stands, platforms, platform shelters, mail cranes, water columns, coal chutes, water tanks, etc., and advised that the subject has been referred to the American Railway Engineering Association for its consideration and recommendation. The committee also included in its report a summary of the number of freight cars, passenger cars and locomotives reported equipped with safety appliances as required by the United States Safety Appliance Standards, July 1, 1914, as follows:

| | Total Number in Service | Fully Equipped with Safety Appliances |
|---|---|---|
| Freight cars | 2,510,214 | 1,204,454 |
| Passenger cars | 56,980 | 52,470 |
| Locomotives | 66,853 | 63,687 |

The joint committee on automatic train stops reported that since the adoption of the requisites of installation for automatic train control, approved by the association on May 20, 1914, no stop device that had been thoroughly and practically tested and had been demonstrated to comply therewith had come to the notice of the joint committee.

## Committee on Electrical Working

The committee on electrical working reported that the diagram of third-rail working-conductor clearances adopted by the association in May, 1912, had been under consideration by the sub-committee in joint session with sub-committees of the American Railway Engineering Association and American Electric Railway Engineering Association, with the view of establishing limiting rolling equipment clearances in the space close to the track rail, for permanent way structures or for other devices such as automatic train stops. These sub-committees had carefully investigated the question, and compiled information received from 183 railway companies as to existing encroachments of rolling equipment within the space under consideration. They had concluded that the third-rail clearance diagram could be extended towards the track rail without materially affecting interchange equipment. A recommendation was therefore adopted by the Association to revise the present standard, to provide for the prolongation of the line *EE-FE* of the standard diagram horizontally to within 6 in. of the gage line of the track. This provision would allow devices attached to the permanent way to project 2½ in. above the top of the track rail in the space between a point 19¾ in. distant from the gage line to a point 6 in. distant.

The committee also reported that it would now be desirable to provide for an extension of the "designing line," which in the diagram ended at a point 18¼ in. from the gage line 6½ in. above the top of the rail, to some point, say 7 in. from the gage line. However, the committee was unable at the present time to fix definitely the location of this extension. The matter had, therefore, been referred to the sub-committee for investigation and report at the next meeting of the association. Reference was made by the committee to its report of April 21, 1913, which covers four diagrams for overhead clearances and adds a fifth diagram for minimum clearances required for direct-current overhead-contact rails, where these are installed under permanent way structures. On the recommendation of the

committee the association accepted these as recommended practice.

The committee reported further that in the spring of 1912 the association adopted, as recommended practice, specifications for overhead crossings of electric light and power lines. These specifications were subsequently adopted by the American Railway Engineering Association, the American Electric Railway Engineering Association, the National Electric Light Association and the American Institute of Electrical Engineers. The American Electric Railway Engineering Association in 1913 adopted a specification differing in some respects from the foregoing. This amended specification had been the subject of consideration by the sub-committee in conference with similar committees of the other associations, in order to effect the adoption of a standard specification by all bodies interested. Their joint report recommended the adoption of the American Electric Railway Engineering Association specification. As the committee indorsed this recommendation and the adoption of the new specification the association adopted the same as recommended practice.

The committee advised that the consideration of overhead crossings for telegraph and telephone lines had been referred to a sub-committee, which had been in conference with similar committees of the American Railway Engineering Association and the American Electric Railway Engineering Association. The sub-committee recommended the adoption of the telephone, telegraph and signal wire crossing specification prepared by the Association of Railway Telegraph Superintendents, with the exception of one paragraph relating to the minimum clearance of poles from railway tracks. The side clearance specified by the telegraph superintendents was not considered sufficient by the sub-committee, and it was recommended that the minimum clearance of poles be made to conform to that established for the transmission line crossing structures. The committee stated that this specification was intended to cover only cases where crossings of telegraph, telephone and other wires were over rights-of-way, and not for cases where it was desirable or necessary (especially where lines are to be electrified) to carry these crossings under tracks by insulated wire cables. It was considered of first importance to fix the conditions of safety for supporting structures and wires over rights-of-way. In the case of underground cable work, which in many cases, if not generally, was the preferred method of providing for low-tension wire crossings, the conditions presented were not of such immediate importance to the railways as in the case of overhead crossings. The specification which the committee offered had not been definitely acted upon by the engineering associations, but the committee thought it desirable to place on record at this time the essentials of a matter which was of immediate and increasing importance to the railroad companies, and the committee, therefore, offered the specifications for adoption as recommended practice of the association. The association took action accordingly.

The sub-committees appointed by the committee for further investigation of continued subjects were as follows: On third-rail working conductors and on overhead working conductor clearances—A. S. Baldwin, chief engineer Illinois Central Railroad Company; J. H. Davis, electrical engineer Baltimore & Ohio Railroad Company; E. B. Katté, chief engineer electric traction New York Central & Hudson River Railroad Company. As representatives of the committee on the national joint committee on specifications for wire and cable crossings—E. B. Katté, chief engineer electric traction New York Central & Hudson River Railroad Company, and J. H. Davis, electrical engineer Baltimore & Ohio Railroad Company.

USE OF JOINT INSPECTION BUREAUS RECOMMENDED

On the recommendation of the committee on relations between railroads a national form of weight agreement was approved. This covered in detail methods of light-weighing and marking freight cars. The committee reported that it had been advised that in official classification territory a uniform charge had been adopted of $2 for cars reconsigned en route and $5 on cars reconsigned at destination and that it understood that similar action was contemplated in other parts of the country. The committee also called attention to the joint interchange and inspection bureaus now in successful operation and recommended the extension of this plan to all important interchange points. Upon recommendation of the committee Rule 7 of the national code of car demurrage rules was amended in regard to demurrage charges on refrigerator cars.

In conclusion the association decided to hold its next meeting in Atlantic City on May 19, 1915.

## Final Meetings of Railway Commissioners

**Evils of Trespassing Discussed — Officers Elected — Next Meeting in San Francisco**

A number of the papers and reports presented during the early sessions of the convention of the Association of Railway Commissioners were published in the issue of last week. The principal report of electric railway interest presented during the concluding sessions was that of the committee on grade crossings and trespassing of railroads. This report is signed by Commissioners Glasgow, Harlowe, Yates and Elmquist.

It states first that upon examining the reports compiled by different states on the subject the committee finds a great variation in method of tabulating these statistics, and it recommends the adoption of uniformity. It says the question of grade separation is becoming more important every year owing to the increased number of motorcycles and automobiles driven by people who have little regard for safety devices or for their own safety. The committee considers that no form of crossing protection equals the separation of grades, but recognizes that this solution is not applicable in all cases, not only on account of the expense involved but also because of the varying conditions obtaining in different cities and states. In some the topography of the country is such as to permit the separation of grades with little difficulty and at moderate expense. In others the contrary is the case. Nevertheless the committee believes that where conditions at all justify the separation of grade it should be effected. For the same reason it is impossible to suggest a uniform law on the subject, but it recommends that the different states should take up the matter and empower the commission of the state to install such protection as the conditions demand.

The committee presented some statistics in regard to trespassers killed and injured in the different states during the past three years. Owing to differences in the fiscal year it was impossible to obtain absolutely accurate figures, but those given are approximate. The totals showed that the number of passengers killed in 1911 were 3888; in 1912, 4208; in 1913, 4354. These figures show that the loss of life is increasing every year and that it equals in number that of passengers and employees combined.

The report points out that the "trespassers" were not the irresponsible people commonly referred to as tramps and hoboes, but were made up of farmers and

laborers in the country and mechanics, business men and women and children in the cities. It says that in no other country are pedestrians permitted to make such common use of the railway right-of-way, and believes that this use could be greatly curtailed by demanding punishment of the violators of the law. The greatest hindrance in the past to enforcement of the law has been the unwillingness of the justices before whom the violators of the law are brought to treat the matter seriously. This can be corrected only by education and the building up of public sentiment.

The report also calls attention to the danger of diagonal crossings because of the apparent inability of the average driver of a vehicle properly to measure the distance to be traveled in making such a crossing or to gage the speed of the approaching train. It recommends that the commissioners receive authority to abolish such crossings and construct right-angle crossings, the expense to be apportioned between the railroad and the city, village or township. A proposed bill for punishment of trespassing was included in the report.

Three reports scheduled on the program were not presented, namely: "Powers, Duties and Work of Railway Commissioners"; "Railway Capitalization," and "Safety Appliances."

The following officers were elected by the commissioners for the ensuing year:

President, Clifford Thorne, of Iowa; first vice-president, Robert R. Prentiss, of Virginia; second vice-president, Max Thelan, of California; secretary, William H. Connolly, Washington, D. C., assistant secretary, James B. Walker, of New York.

San Francisco, Cal., was chosen as the meeting place for the next convention, which will open Oct. 12, 1915.

## Meeting of Society of Chemical Industry

### The Action of Manganese and Titanium in Rails and Other Commercial Steel Was Discussed

At a meeting of the Society of Chemical Industry, held in New York on Friday, Nov. 20, two papers were presented which dealt with the effects of different alloys on steel. One of these, entitled "Manganese Steel," was read by John H. Hall, consulting engineer, New York, who first outlined the early experiments with manganese. He explained that low-carbon manganese steel containing less than 8 per cent manganese was brittle and practically worthless. By means of graphs plotted between manganese content and carbon content he showed the results of experiments demonstrating that when the contents lay along the line drawn from 12 per cent manganese to 1.5 per cent carbon the resulting alloy steel was tough and strong. No valuable properties had been discovered in experiments which were made with very high manganese contents, or those of 30 per cent and over.

Mr. Hall states that manganese steel was characterized by a high coefficient of expansion, a lack of magnetic qualities, considerable brittleness when cast, a low fusing point and a very high tensile strength. Its hardness was peculiar, owing to a lack of response to Brinnel tests, this being due to the very low elastic limit of manganese steel in compression. It possessed, however, the ability to develop a surface hardness of extreme character under repeated blows, provided these were insufficient to wear away the hard skin as rapidly as it was formed. The resistance of all manganese steel to wear and abrasion was extraordinary and this accounted for its wide use where extreme wear and the presence of grit were encountered. With relatively high manganese contents, say 12 per cent, with 1.25 per cent carbon, the tendency to flow under pressure was increased. The steels with low manganese contents tended to flow less under pressure but were more brittle. It was this tendency to flow under loads that prevented the use of manganese steel for car wheels.

Manganese steel was produced by mixing molten ferromanganese and molten steel containing 1.25 per cent carbon, the use of any process of steel making being possible. The crucible process was, however, objectionable on account of the absorption of carbon from the graphite crucibles. With the open-hearth process the furnace had to be very small, and was not altogether desirable because it had to be run continuously, whereas foundries where manganese steel was used generally ran only in the day time. Small Bessemer converters were most convenient for manganese-steel manufacture on account of the low first cost and possibility of intermittent use.

The manufacture of manganese-steel castings invariably involved about 40 per cent of scrap. When the scrap castings were remelted by the Bessemer process the manganese was all lost, and the use of the electric furnace had been proposed for melting scrap, although it was not altogether desirable owing to its high cost. The electric furnace had also been proposed for melting the ferromanganese before it was added to the steel. This was quite a problem as the addition of cold ferromanganese would involve freezing of the steel, and the melting of the ferromanganese customarily had to be done in crucibles.

In discussing the commercial forms of manganese steel, Mr. Hall said that practically all of it was cast. Its great fluidity and low melting point helped the foundryman, but, on the other hand, its great shrinkage in cooling made it very likely that the castings would break. Annealing was generally used to prevent shrinkage strains, but the design of the casting was exceedingly important, and even with good pattern design the production of perfect castings was difficult. In the heat treatment the castings had to be brought up to the temperature of recalescence with great care and they could not be allowed to cool below this temperature to any considerable extent before quenching. As the temperature of the casting fell away from the proper temperature the treated steel would lose toughness, the heavier castings having less temperature leeway in heat treatment than the light ones. The heat-treating temperature was in the vicinity of 1000 deg. Cent. and, owing to the sudden quenching in water at this high temperature, breakage sometimes occurred. The design of casting was, therefore, important in this instance as well as at the time the molten metal was poured into the mold.

Mr. Hall stated that rolling manganese steel was a possibility and was accomplished in some instances. The major difficulty in the way of rolling was the very narrow range of temperature at which the metal could be worked. If manganese steel was rolled too cold it broke the rolls in the mill. If it was rolled too hot it tended to crumble.

In the discussion of the paper the matter of surface hardening under blows was brought up, and the effect of this quality in preventing the peening of railway crossings was commented on. It was stated that the surface hardening reached a maximum after a surface indentation of about 5 per cent. With crossings where the angle was such that the car wheel would acually jump, the wear was sometimes rapid enough to render negative the surface hardening effect, and the result was that a failure of the crossing took place from peening. It was stated that it was possible to case-harden steel with ferromanganese placed inside of the mold, but that this produced only a very thin skin of

hard metal. The price of manganese-steel castings ranged between 7 cents and 18 cents per pound.

In answer to a question, Mr. Hall said that the presence of silicon, sulphur and phosphorus in the steel occurred, in general, in only small amounts and that they were of very little importance in manganese steel. With regard to results in service he spoke of rails on the Boston Elevated Railway which, when made of Bessemer steel, lasted six weeks, when made of open hearth steel lasted three months, and when made of manganese steel lasted two and one-half years. In the rolls for a stone crusher it was found that 6 per cent manganese was as good an alloy as 12 per cent manganese, but that either one wore ten times as long as rolls made of ordinary open-hearth steel.

### EFFECT OF TITANIUM ON STEEL

A paper entitled "Titanium and Its Effect on Steel," by George F. Comstock, was then read. In this it was explained that the element titanium was widely distributed throughout the earth, although it was found nowhere in large quantities. It was invariably found in nature as an oxide, as it burned readily, its affinity for oxygen enabling it, when not in the form of an oxide, to rob molten steel of oxygen. In addition it had a very strong affinity for nitrogen. The compounds formed by the oxidation of titanium possessed stability to a very marked degree, the contrary being true of the pure element. The order of stability of the various forms were: oxide, nitride and carbide, the latter being the compound customarily used in manufacture. The carbide as a deoxidizer was practically as good as the pure element and was very much cheaper.

Titanium steel proper was not commercially made, the practical value of the titanium being its purifying effect. For this reason results equal to those obtained from the so-called titanium steel could be produced by the ordinary processes of manufacture provided these were sufficiently thorough. No changes in microstructure were effected by the presence of titanium. The actual titanium content found in commercial steel did not exceed 0.025 per cent. Titanium could be used in steel made by any process, but at the present time the demand for it existed mainly in the case of rails, so that it was used most frequently with the open-hearth process.

The introduction of the titanium was effected while the molten steel was being poured from the furnace to the ladle, the steel after the addition of the titanium being held in the ladle from three minutes to ten minutes. Thirteen pounds of the alloy called ferro-carbon-titanium (the equivalent of the carbide) were usually added per ton of steel, and the actual addition of the pure element approximated 0.1 per cent. The cost of the process added about 5 per cent to the price of the rail.

The process was purely one of oxidation, together with the cleansing effect of the titanium which acted as a flux for the silicates and other slags and made them rise to the top of the metal. Therefore, the advantages obtained from it were greater soundness of the metal and freedom from segregation. Blowholes, which were due to trapped bubbles of carbon monoxide in the molten metal as it "froze" or cooled, were also reduced, and though they were always present in low-carbon titanium steel they contained no slag and could be rolled out. The serious defect, segregation, was described as nothing but selective freezing, and in well-deoxidized steel the freezing took place quietly in the pasty mass of cooling metal, the carbon monoxide bubbles having been eliminated by the deoxidizing process. However, the deoxidation of steel usually involved extended pipes as an offset to the elimination of blowholes. Some failures in the prevention of segregation by titanium had been observed, but in such cases only very small amounts of titanium of the order of 0.005 per cent were found upon analysis, indicating that the steel had reached the ladle in a badly over-oxidized condition and that not enough titanium had been added to overcome it.

A number of tests were cited by the author to demonstrate the improvements effected by the use of titanium, of which the important ones were in the freedom from flaws. The tests applied largely to rails, one case being cited where a titanium rail on the Boston Elevated Railway showed 41 per cent less wear than the adjacent standard rails. It was also stated that titanium steel was used for axles to stop segregation and that its use in thin sheets was very effective, the sheets rolling exceptionally fine and smooth, and being well suited for galvanizing.

## New A. I. E. E. Standardization Rules

**Being a Summary of Some of the Notable Changes in the Railway Section of the 1914 Rules from the 1911 Rules**

In last week's issue of the ELECTRIC RAILWAY JOURNAL, page 1152, attention was called to the fact that the finally-approved standardization rules of the American Institute of Electrical Engineers would go into effect on Dec. 1. A brief summary was there given of the principal final revisions which had been approved by the standards committee on Nov. 14. These among other changes had been made from the preliminary edition of the rules approved by the board of directors on July 10 and circulated in tentative form (green cover edition). In the following paragraphs are summarized, from the electric railway standpoint, some of the notable changes in the 1914 rules from the 1911 rules which they now supersede. This analysis is based upon the Dec. 1 edition which differs in important details from that of July 10.

In the old rules the only special attention given to electric railway apparatus was in a two-page section of the appendix, comprising a half-page on railway motor rating and the remainder on the selection of motors for specified service. At the time the old rules were adopted there was little unanimity of opinion regarding the whole subject of railway motor rating. In the new rules the sections relating to electric railway equipment, forty-eight in number, fill six pages, and a three-page appendix is devoted to supplementary matters relating to railway motors.

### STANDARDS FOR ELECTRIC RAILWAYS

In the rules are given under the heading "Standards for Electric Railways" groups of sections under "Definitions," "Rating of Railway Substation Machinery" and "Conductors and Rail Systems."

Under the first heading are definitions of "transmission system" and "distribution system" practically identical with those given in the Interstate Commerce Commission standard classification of accounts for electric railways. A substation is next defined as "a group of apparatus or machinery which receives current from a transmission system, changes its kind or voltage, and delivers it to a distribution system."

In the rating of railway substation machinery particular attention has been given to intermittent loads, and the distinction between nominal and Institute continuous ratings is made. The former is the "Kva output at a stated power factor imput which, having produced a constant temperature, may be increased 50 per cent for two hours without exceeding the standard

ultimate temperature rise. In the case of frequency-changers the power factor of the output shall also be stated.

"Machines in substations subjected to extreme fluctuations of load should be capable of carrying a load of twice their nominal rated load, for a period of five minutes, and should also be capable of carrying a load of three times the nominal rated load for one minute, without disqualifying them for continued service. These overloads shall be applied after a continuous run at nominal rated load." The continuous rating is that load, at 100 per cent power factor which a machine, fulfilling the general Institute specifications for strength, commuting qualities, etc., will carry continuously with a temperature rise not exceeding that specified in the following table:

Table of Hottest-Spot Temperatures and of Corresponding Permissible Temperature Rises

| Class | Description of Insulation | Highest Permissible Temperatures for Hottest Spot | Highest Permissible Temperature Rise of Hottest Spot Above 40 Deg. for the Purpose of Fixing the Institute Rating |
|---|---|---|---|
| A1 | Cotton silk, paper and other fibrous materials, not so treated as to increase the thermal limit | 95 deg. Cent. | 55 deg. Cent. |
| A2 | Similar to A1, but treated or impregnated and including enameled wire | 105 deg. Cent. | 65 deg. Cent. |
| B | Mica, asbestos or other material capable of resisting high temperatures, in which any Class A material or binder, if used, is for structural purposes only, and may be destroyed without impairing the insulating or mechanical qualities | 125 deg. Cent. | 85 deg. Cent. |
| C | Fireproof and refractory materials | No limit | |

The sections on conductor and conductor systems define terms and specify essential details of contact rails, trolley and messenger wire or cable and classes of construction. The important dimensions specified are: 26 in. to 27 in. for third-rail gage; 2¾ in. to 3½ in. for third-rail elevation; 18 ft. for the height of the lowest point of a trolley wire under maximum conditions of sag unless local conditions prevent, and 21 ft. on trackage operating electric and steam railroad equipment and at crossings over steam roads. These dimensions were specified upon the advice of the American Electric Railway Engineering Association.

## Rating of Railway Motors

As in the preceding sections the nominal and continuous ratings are distinguished. The nominal rating is as in 1911 except that it is specified in kilowatts and reference to a room temperature of 25 deg. Cent. is omitted. The continuous ratings are the inputs in amperes at which the motor may be operated for ½, ¾ and full voltages respectively without exceeding the following temperature rises when operated on stand test with motor covers and cooling system, if any, arranged as in service: Class of material $A$, (see preceding table), temperature rises of windings, by thermometer 65 deg., by resistance, 85 deg.; class of material $B$, 80 deg. and 105 deg. respectively.

## Operating Temperature Limitations

In addition to the above stand test limitations the following permissible operating temperatures are specified: Class of Material $A$,, maximum observable temperature of windings when in continuous service, by thermometer, 85 deg., by resistance, 110 deg.; class of material $B$, 100 deg. and 130 deg. respectively. For infrequent occasions, due to extreme ambient temperatures, it is permissible to operate at 15 deg. higher temperature.

Field control motor ratings are specified on the basis of performance with the operating field which gives the maximum motor rating.

## Motor Efficiency and Losses

The specifications of efficiency determination are in form to permit easy checking of performance guarantees. The efficiency is determined from losses as follows.

Copper loss is calculated from resistance measurements corrected to 75 deg. Cent.

No-load core loss, brush friction, armature-bearing friction and windage are measured by operating the motor without gears and with the kind of brushes and brush pressure as in commercial service. With the field separately excited, such a voltage is applied to the armature terminals as will give the same speed for any field current as is obtained with that field current when operating at normal voltage under load. The sum of the losses mentioned is then the product of the counter-emf and the current.

Core loss in d.c. motors is separated from friction and windage losses above described by measuring the power required to drive the motor at any given speed without gears, by running it as a series motor on low voltage and deducting this loss from the sum of the no-load losses at corresponding speed. Or it may be obtained by separately exciting the field and driving the armature from a motor having known losses, and noting the difference in losses between driving the motor light at various speeds and driving it with various field excitations. Core losses in d.c. motors under load should be assumed as follows:

| Per cent of input at nominal rating | 200 | 150 | 100 | 75 | 50 | 25 and under |
|---|---|---|---|---|---|---|
| Loss as per cent of no-load losses | 165 | 145 | 130 | 125 | 123 | 122 |

The brush-contact loss to be used in determining efficiency may be obtained by assuming that the sum of the drops at the contact surfaces of the positive and negative brushes is 3 volts.

The loss in gearing and axle bearings in single-reduction, single-geared motors varies with type, mechanical finish, age and lubrication. The following are given for comparison:

| Per cent of input at nominal rating | 200 | 150 | 125 | 100 | 75 | 60 | 50 | 40 | 30 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|
| Losses as per cent of input | 3.5 | 3.0 | 2.7 | 2.5 | 2.5 | 2.7 | 3.2 | 4.4 | 6.7 | 8.5 |

## Other Rules and Data

The last sections of the rules are devoted to definitions of terms relating to electric locomotives.

In the appendix relating to railway motors suggestions are made as to the data needed for selecting motors for specified service and for pre-determining the performance of a motor in service when it cannot be tested under service conditions.

The following average data as to mechanical losses, based on the results of many tests, are given as a basis for comparison:

| Per cent of input at nominal rating | 100 or over | 75 | 60 | 50 | 40 | 30 | 25 |
|---|---|---|---|---|---|---|---|
| Losses as per cent of input | 5.0 | 5.0 | 5.3 | 6.5 | 8.8 | 13.3 | 17.0 |

These figures include axle bearing, gear, armature bearing, brush friction, windage and stray-load losses. They apply to single-reduction, single-geared motors.

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The ordinance adopted by the City Council of Kansas City, Mo., requiring drivers of automobiles to dim their headlights was amended on Nov. 3 to include street cars. The ordinance will go into effect on Jan. 1.

# COMMUNICATIONS

## Effect of Car-Wheel Diameters on Motors

SCRANTON, PA., Nov. 11, 1914.

To the Editors:

I beg leave to submit for the consideration of Messrs. Parks, Nottage and Foote, and of any others who may be interested in the question, the following theoretical consideration of the effect of car-wheel diameter on motors.

For a given car equipment, the tractive effect per motor which is used in overcoming the train resistance for motor, is

$$T = \frac{K}{D} T^1 \text{ lb.} \qquad (1)$$

in which $K$ is a constant depending on the gear ratio and gear efficiency; $T^1$ is the net effective torque in pound-feet; and $D$ is the diameter of the car wheel in inches.

Considering the total train resistance for a given set of conditions (weight, head-on cross-section and speed of car, grade, curvature and acceleration if starting), to be divided equally between all the motors on the car, irrespective of variations in the car-wheel diameters, we will suppose a two-motor equipment in which the wheels of truck No. 1 are $D$ in. in diameter and those of truck No. 2 are $(D + d)$ in. in diameter. From equation (1) we then have for the respective motor-torques,

$$T^1_1 = \frac{DT}{K} \text{ lb.-ft.} \qquad (2)$$

and

$$T^1_2 = \frac{(D+d)T}{K} \text{ lb.-ft.} \qquad (3)$$

From these last two equations, we obtain

$$T^1_2 = \left(\frac{D+d}{D}\right) T^1_1 \qquad (4)$$

which indicates that the torque required of the motors on truck No. 2 (which has the large wheels) is $\frac{D+d}{D}$ times that required of the motors on truck No. 1.

For any electric motor, the theoretical torque, developed by the passage through the motor of a current $I_a$, is

$$t = 0.117\Phi Z^1 I_a \text{ lb.-ft.} \qquad (5)$$

where $\Phi$ = the magnetic field flux per pole;
and $Z^1$ = a constant for a given motor, depending upon the number of poles, and the kind of armature winding.

(For a complete discussion of the foregoing equation, see Vol. I, Franklin & Esty's *Elements of Electrical Engineering*, page 99.)

In a series motor designed for electric railway service, the magnetic circuit is operated very nearly at the point of saturation, except at very light loads. Consequently, we may, with little error, assume that for all operating current values the magnetic flux per pole is a constant. Also, the net effective torque available at the pinion of the motor is less than that expressed in equation (5) by the amount of the torque required to overcome friction and other stray-power losses. Assuming that under the conditions existing we may neglect these losses, and that we may call $\Phi$ a constant, we may write, from (5),

$$T^1 = CI_a, \qquad (6)$$

where $T^1$ is the net effective torque as used in equation (1) and $C$ is a constant equal to $0.117\Phi Z^1$. Writing variations of equation (6) for the torques of the two motors under consideration, and substituting the same in equation (4), we obtain

$$I_{a_2} = \left(\frac{D+d}{D}\right) I_{a_1}, \qquad (7)$$

where $I_{a_1}$ and $I_{a_2}$ are the motor currents for motors No. 1 and No. 2, respectively. The constant $C$ for each motor torque is considered the same since the magnetic circuits are presumed to be nearly saturated for the operating current values, $I_{a_1}$ and $I_{a_2}$.

Equation (7) indicates the relative values of the currents taken by the motors on the two trucks. The current taken by the motor geared to the large wheels is, of course, greater than that consumed by the motor geared to the small wheels. Thus, if on a two-motor car, motor No. 1, geared to 32-in. wheels, takes 80 amp under a certain set of conditions, motor No. 2, if geared to 33-in. wheels, will take $\frac{33}{32}$ times 80 amp, or 82.5 amp. This, of course, is a purely theoretical value, and, at that, is only an approximation. It would seem, however, that the increase in motor currents due to small differences in wheel diameters should not be sufficiently large to cause trouble.

The foregoing is offered, not as the "practical solution" desired by Mr. Foote in the ELECTRIC RAILWAY JOURNAL for Oct. 31, nor as an entirely correct and accurate technical consideration of the many complexities of the question. Rather, it is desired that this letter be part of the discussion suggested by Mr. Foote, and an indication of the peculiar points involved in a final solution.

J. M. WALSH.

## Encouraging Railway Employees to Use Technical Books

FREE PUBLIC LIBRARY

NEW HAVEN, CONN., Nov. 23, 1914.

To the Editors:

The public library at New Haven has been making an effort to interest the employees of the local electric railway company in the books relating to their line of work. With the co-operation of J. K. Punderford, general manager of the company, we distributed through the chief motorman a hundred or more lists of books which we thought would be of value. These lists were also placed in the three carhouses. A special effort was made to reach new men. As a result, at the end of two weeks of effort our circulation of electric railway books was next to the highest of all classes for this department, whereas before it was practically negligible. Books that have been popular are Gutman's "Motorman and His Duties," Aylmer-Small's "How to Become a Successful Motorman," Harding's "Electric Railway Engineering" and Ashe and Keily's "Electric Railways." The ELECTRIC RAILWAY JOURNAL also has its devotees. There is a crying demand for practical books which we have tried to meet by supplying instruction books and bulletins of the General Electric and Westinghouse companies.

We call the attention of the men to the technological room in the library and to the fact that it is for their use free. Then when they come in and make themselves known we show them the books and pick out some new subject in railroading as a basis of conversation. Then we gradually lead up to the topic of their own work and thus overcome the embarrassment that is general on the occasion of the first visit to an institution of this sort. If, in the course of the conversation, no interest is manifested we try to locate some hobby, which usually crops out eventually. If it develops that

a visitor entertains just a little fear of books and book knowledge and does not seem to be able to get information from books we endeavor to show him how to overcome this lack.

We cannot say that the demand for books has been as great as the number of electric railway employees would seem to warrant, because there are many difficulties confronting the "front-end" man who wishes to advance. The very fact that a man is seen with a book in his hand gives the impression that he is after an inspector's or starter's job and he is apt, like the teacher's pet among school children, to be looked down upon by his companions.

Summing up the results of our efforts to help the men it may be said: (1) That our circulation jumped in two weeks from lowest to next to highest for this department; (2) that we have a steady group of book users; (3) that all electric railway men here, from the general manager down, know that we have their interests in mind, and (4) that the men who come to the library are worth working for and that it is a good policy to help the one man in a hundred who wants to get ahead rather than to throw up our hands in despair because ninety-nine do not care to advance.

When convincing arguments can be presented to the men a great gain will have been made and we hope to persuade them to use books steadily. We have great hopes of interesting the new men who will be broken in in January.

KENNETH C. WALKER,
Head Department of Technology.

## Corrosion of Metals in Natural Soils

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASS., Nov. 24, 1914.

To the Editors:

I am very glad that Messrs. Scofield and Stenger decided to publish their paper on "Corrosion of Metals in Natural Soils," which appeared in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 14. This paper should be read with considerable interest by electric railway engineers, as it is one of the few definite contributions which we have on this subject.

It is undoubtedly true that under the proper soil and electrode conditions a considerable amount of self-corrosion can take place, enough at times to show the same magnitude of results as though the damage had been done by stray railway currents.

When self-corrosion can be shown to have produced such results as are shown by Messrs. Scofield and Stenger, the subject becomes a very live one to electric railway operators, as in many cases it should proportionately reduce the responsibility that pipe owners might attempt to fix on the electric railway company. The subject seems to have had a very careful study in Minneapolis, and we are to be congratulated that the officials of that company have seen fit to give us the results of their investigations.

ALBERT S. RICHEY,
Professor of Electric Railway Engineering.

The report of business done by the Public Service Commission for the Second District of New York for October shows an increase in the number of new cases filed with the commission. The commission disposed of seventy-six formal cases during the month, while eighty-seven new ones were submitted. This makes a total of 549 formal cases disposed of since March 16, 1914. A total of 106 informal cases was filed with the commission during the last month, and final disposition was reached in 129 old and new informal complaints. The total number of informal complaints disposed of since March 16 is 1216.

## Fare Decision in Manchester, N. H.

**Six Per Cent Return Allowed on Investment in Property—Depreciation Considered at Length**

The Public Service Commission of New Hampshire has rendered a decision in the fare case which has been before it for several months. An abstract of the brief of the company in this case was published on page 88 of the issue of this paper on July 11. The commission orders the Manchester Street Railway to sell tickets to school children with full transfer privileges, for use on the way to and from school, at the rate of six tickets for 25 cents and twenty-five tickets for $1, dating from Dec. 1, 1914. Under the law the board was asked to investigate whether the company reasonably could be required to sell tickets at these rates and also whether the company could be required to sell tickets to the general public at these rates good before 8 a. m., between 11:30 a. m. and 1 p. m., and from 5 p. m. to 7 p. m. As to the school tickets, it was admitted that the number of those who would use them is comparatively small and that the establishment of this rate would not largely reduce the company's revenue. The other proposed reduction was dismissed by the board on the ground that it would prevent a reasonable return on the fair value of the company's property. An abstract of the decision is printed below.

To ascertain the value of the property, the commission employed the engineering firm of Sloan, Huddle, Feustel & Freeman, of Madison, Wis., the company being represented on this work by Hollis French, of Boston, Mass., its consulting engineer. Edwin F. Jones and Frank S. Streeter appeared as counsel for the company. The commission reached the sum of $1,599,728 as the cost of reproduction new of the physical properties and $1,154,253 as the cost new less accrued depreciation. The company's engineer agreed to the foregoing estimate of cost new except that he allowed $27,500 more for track and $19,200 more for depreciation. The variation was due to the use of current prices by the company, whereas the board held that a five-years' average is preferable as in the Berlin Electric Light Company case, 3 N. H., P. S. C. Rep. 174, 196. The capitalization, including $133,500 in notes outstanding, totals $1,402,750, and the cost of road and equipment as carried on the books for the year ending June 30, 1913, was $1,399,106. The correspondence between the cost of reconstruction new, the construction account and the amount contributed by the stockholders, is extraordinarily close. Making some allowance on the one hand for possible inadequacies in the construction account, and on the other for advances in construction costs and appreciation in land values, it appears that the property has been principally built up out of funds contributed directly by the stockholders, and that very little has been put into it out of earnings. This fact is extremely important in determining the amount upon which the company should be allowed to earn a return.

The board finds that the average dividend received upon the capital stock has been 5.839 per cent since 1889, and upon the actual investment of the stockholders 5.58 per cent, the averages being obtained by ascertaining the relation between the total amount paid in dividends and the total of the principal sums upon which those dividends were paid. The commission holds that the foregoing constitute at least an approximately fair return upon the value of the property. It holds that 6 per cent upon the fair value of the property constitutes a reasonable return on such a business as the Manchester Street Railway, occupying a monopoly in the transportation field in the large and growing city in which it operates.

(Population, 1910, 70,063.) President E. C. Foster testified that in his opinion a higher rate than 6 per cent is needed to attract street railway capital, but the board holds that 6 per cent in a street railway in a thriving New England city is as attractive as a 7 per cent return in a Southern property of similar size. The commission holds that it is immaterial how the return on the value of the property is divided between stock and bonds, and points out that if the capitalization were half in bonds at 5 per cent, 7 per cent could be paid on the stock to yield a fair return. The company has no bonded indebtedness, however. Except for the appreciation in land values, there has been during the greater part of the company's history no great discrepancy between the investment and the value of the property.

### DEPRECIATION

The present depreciated value of the property, excluding appreciation in land values, is $1,050,000. There has, therefore, been a total depreciation of $450,000, of which $100,000 has been made good out of earnings, while the balance of $350,000 remains a loss to the stockholders unless it is in some way made good to them. The company's counsel claimed that the depreciation should not be taken into account so long as the service is not impaired, and that the cost of reproduction new is the true measure of the present fair value for rate-making purposes. This theory the board has several times considered and rejected (Manchester Gas case 4 N. H., P. S. C. Rep., 337, 405). It held that according to the United States Supreme Court there is no constitutional right to demand a return upon more than the present depreciated value of the property, but that justice may often require that a return be allowed upon a larger sum. In the Manchester Gas case, the utility during the full period of its existence had paid not only adequate but excessive returns on its investment and had also put into the property out of earnings an amount more than sufficient to make good its accrued depreciation. To allow a return upon the full undepreciated value of its property would have been to permit it not only to get the return upon its investment to which it was unquestionably entitled but also to capitalize and make the public forever pay a return upon what was in fact a depreciation reserve provided out of rates which the public had paid. Justice clearly did not require such action.

The present case presents an entirely different situation. The railway company, instead of paying to its stockholders more than an ample return and keeping its property good, and even adding to its value, out of its earnings, has barely paid a fair return in the form of dividends on the amount actually invested, and above that has been able out of its earnings to make good only $100,000 of the $450,000 depreciation which the property has suffered. Of the remaining $350,000 a part is offset by appreciation in land values, leaving $250,000 representing a clear loss to the stockholders as a result of the public service which they have performed, if they are for the future to be allowed a return only on the depreciated value of their property. Justice does not require that they should suffer this loss. In the general outcry against inflated capitalization there is never found a suggestion that a public service corporation, well planned and efficiently managed, should not be allowed a fair return upon at least the full amount of its bona fide investment. It has been unable to do so at the rates which it has charged and has suffered a substantial loss as the result of its operations. Justice requires that it have an opportunity to make that loss good.

Technically, depreciation should be made good out of earnings. But it is out of the question for this company to make good out of its earnings a loss of $250,000. It could only be done by increasing the rates. And an increase of the 5-cent fare in the city of Manchester is not seriously to be considered. Neither the company nor the public would desire it. The board, therefore, finds that justice to the company and to the public good alike requires that the deficiency in the present depreciated value of the property below the amount actually invested by the stockholders be regarded as a cost of developing the business, and as such added to the depreciated value to determine the present fair value of the property devoted to the public service, and that the company should hereafter be allowed to earn annually a fair return upon $1,402,750, the amount of its bona fide investment, which fair return is found to be 6 per cent, together with a sum sufficient to take care of the annual depreciation of the property. This valuation takes due account of all depreciation, including functional depreciation due to changes in the art and the discarding of obsolete plant and equipment. No consideration is given to working capital, because it does not appear that the company has any beyond its stores and supplies, totalling $32,527, and included in the engineers' valuation. The board finds that the expenditures of the company are in general normal and reasonable. The amount charged to maintenance of way and equipment is perhaps somewhat higher than the average, but it would not be in the public interest to lower the high standard of maintenance by curtailing expenditure.

### POWER

The question of whether the cost of power is excessive received much study. The railway purchases power from the Manchester Traction, Light & Power Company, which owns its stock, at a price of 2.25 cents per kw-hr. of alternating current furnished. In 1913 it purchased 5,229,013 kw-hr. at a total cost of $110,979. The railway company converts the energy into direct current in a substation of its own which cost $128,000, and the operating expenses of which are about $20,500 per year, including interest on the investment. It appears on analysis that the street railway paid $7,439 more for its power than it would have paid had it been entitled to take it on a five-year contract under the Traction company's Schedule D. The board recognized that the street railway company has the first call on the power system, after the street lighting service, and as it overlaps the lighting peak in many of its rush-hour demands, necessitates the maintenance of steam plant capacity. The board finds that the price is not unreasonably high, although a slight overpayment may be made to the traction company.

### CONCLUSIONS

The board's conclusion is that the operating expenses cannot be expected to decrease as time passes, but must be expected to increase, with growth of business. To determine the effect of the proposed reduction in rates a traffic count was made of rush-hour and other-period passengers for an entire week in January and July, 1913, counting separately all who rode on the cars before 8 a. m., from 11:30 a. m. to 1 p. m., and between 5 and 7 p. m., on week-days. It was found that 39.03 per cent traveled in these rush hours, the segregations being 13.205 per cent, 8.364 per cent and 17.634 per cent. It is estimated that the receipts would be reduced by $25,212 on the 1913 earnings basis if the rates were reduced for rush-hour riders and would prevent the earning by the company of a reasonable return upon the fair value of its property.

# ASSOCIATION NEWS

## JOINT COMMITTEE ON OVERHEAD AND UNDERGROUND CROSSINGS

The second meeting of this committee, which is still in the formative period, was held at association headquarters on Nov. 17. The first meeting was held on Sept. 30, and the third is scheduled for Dec. 16 at the same place. The following attended the meeting: Farley Osgood, Public Service Electric Company, chairman; G. W. Palmer, Bay State Street Railway Company, vice-chairman; R. D. Coombs, consulting engineer, New York, secretary; B. T. Anderson, Lackawanna Railroad; C. L. Cadle, New York State Railways; E. B. Katté (represented by deputy) New York Central Railroad; W. T. Oviatt, Narragansett Electric Lighting Company; P. H. Thomas, consulting engineer, New York, and L. S. Weld, Long Island Railroad. The committee discussed plans for its work and organization. It will eventually consist of about twenty representatives of all interests involved in overhead or underground crossing matters. Eventually suggested specifications will be prepared and submitted to the engineering public for criticism. The committee hopes also to be in a position to give advice on crossing problems when requested to do so. The new committee is the outgrowth of a committee of the National Electric Light Association on overhead construction formed in 1911 and subsequently enlarged into a joint committee by the addition of the chairmen of similar committees of other associations.

## MEETING OF THE DENVER TRAMWAY COMPANY SECTION

The twenty-first monthly meeting of the section was held on Nov. 19, William M. Casey presiding. The following officers were elected: President, C. B. Wells, superintendent of transportation; vice-president, George L. Rice, superintendent Southern division; secretary-treasurer, H. G. Mundhenk, stenographer transportation department, and director for two years to fill the vacancy created by the expiration of Mr. Wells' term, A. N. Evans, engineering department.

The feature of the meeting was a series of talks by delegates to the Atlantic City convention of the association. Those who spoke at length were John A. Beeler, G. W. Dolezal, W. C. Swisher, E. L. Rice and W. H. Seip, Messrs. Casey, Adams and others took part in the discussion. The attendance at the meeting was 120.

## R. H. INGERSOLL ON TELEPHONE DISPATCHING

In our issue for Nov. 21, page 1165, the recent Denver Company Section paper on the above subject by R. H. Ingersoll, chief dispatcher, was mentioned. In this paper the author stated that the dispatching of streets cars on city lines by telephone is the result of an inspiration that came just twenty-five years ago to C. K. Dunham, one of the early superintendents of what is now the Denver City Tramway. He gave interesting details of the work of his department, stating that it requires fifty-four telephones on thirty circuits operated by five men. He compared the dispatching system to the human brain, the driving, directing and controlling element. In the Denver Tramway it is a veritable clearing house for detail. Almost every department touches elbows with the dispatcher at some angle of its work. For example, a track greaser may find stones in the same switch day after day. He reports this to the dispatcher, who notifies one of the company's special officers. Again, the track repair gang and line repairmen keep the dispatcher notified of their whereabouts so that an emergency track or line trouble may be brought to their attention promptly. In case of sudden load, the dispatcher notifies the power house in time to prepare for it, as when heat is to be turned on as indicated by signal from the dispatcher's office. The superintendent of rolling stock provides the dispatcher with a list of cars, plows, sweepers, etc., distributed among the carhouses. He frequently calls upon trainmen for reports as to the condition of sand boxes at the ends of the line. In Denver the conductor pays his motorman and himself every night, keeping the record of the time given the car, trip by trip, by the dispatcher, so that the dispatcher's sheet is the record of every trainman's time for the day.

All of the above matters are incidental to real dispatching. When all cars are reporting on time, the work of dispatching is not difficult, for by long practice the schedules are memorized and the time can be given and put down quickly. The test of the dispatcher comes when nothing is on time. More important than figuring time is the judgment he displays. He must be a good guesser of what the conditions are and what each crew can and will do under those conditions. A dispatcher should have good street car sense combined with an ability to understand conditions and figure the best way out of his difficulties quickly.

The telephone dispatching system affords the superintendent the greatest facility for keeping in touch with every detail of the operation of cars. The flexibility of the car service and the rapidity with which it enables the dispatcher to adjust the headway on any line, are the strongest points in favor of this telephone system. In every city the travel demands the addition of extras in the morning and late afternoon, and by the telephone system the dispatcher can put out and withdraw such trippers without confusion, equalizing the spaces between the regular cars as fast as such extras are put out or withdrawn. Any congestion caused by accident or blockade also may be adjusted without difficulty in the same manner. There is a regular method of pulling down the lines at night, as the load or travel drops off; but if the dispatcher finds that the travel on any line is such as to require increased service, he may hold the full quota of cars, and if necessary use cars which are not needed on other lines. In this way, through the agency of but one or two men, who are alive to the needs of the patrons on all lines, the service is reduced to a minimum.

The use of the telephones employed in this service should be restricted by the dispatcher to those who in their line of duty are interested in the movement of cars, and when the use of the telephone is so limited a certain respect attaches to the messages transmitted and the tendency for small talk is discouraged. This small talk not only keeps someone else from getting in touch with the dispatcher, but it breaks down the wall of respect which should surround the dispatcher's office.

Mr. Ingersoll's paper provoked a lively discussion, and the men who are in contact with the dispatching system gave illustrations of its working and enthusiastically supported the speaker's contention.

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The plan of piling the snow along the curb line as is done in Montreal is to be followed by the New York railways during the coming winter, except that in New York a new type of sweeper with an out-board broom will be used instead of the out-board plow of Montreal. The difference is obviously necessitated by the practical absence of sleighs in New York, a circumstance which makes it necessary to remove all snow from the street surface rather than to leave a coating of a few inches.

# Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

*(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)*

## Equipment Defects—Control Connections —III—Changing Motors from Series to Parallel

BY C. W. SQUIER, E. E.

With straight rheostatic regulation the control connections are comparatively simple as it is necessary only to arrange the circuits, as already described in a previous issue, and provide the means for decreasing the

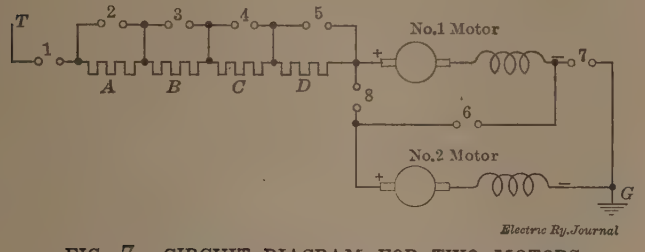



FIG. 7—CIRCUIT DIAGRAM FOR TWO MOTORS

resistance of the circuit. When a series-parallel grouping of the motors is desired, however, it is necessary to provide contacts for making the transition from series to parallel. The control connections then become more complicated.

Let us consider what steps are necessary to change the connections of two motors from series to parallel. By referring to Fig. 7, the circuit diagram for two motors, we see that two motors are connected in series by connecting the positive side of No. 1 motor to line through the regulating resistance, the negative side to the positive terminal of No. 2 motor, and the negative terminal to No. 2 motor to ground. To change this to the parallel connection it is necessary to open the circuit between the negative side of No. 1 motor and the positive side of No. 2 motor, and connect the positive side of No. 2 motor to line and the negative side of No. 1 motor to ground. The sequence by which this change or transition is carried out has led to what are called respectively the "open circuit" and the "short-circuited motor" methods.

### Open Circuit Transition

If, in making the change from series to parallel, we first open the connection No. 6 between the motors, the circuit through both motors is opened so that power will be entirely shut off for a short interval. If the positive side of No. 2 motor is then connected to line by closing contact No. 8, and the negative side of No. 1 motor to ground by closing contact No. 7 at the same time, the change from series to parallel will be completed. This procedure, because the circuit is opened for a short interval, is called the "open circuit" method and is that used with the General Electric Company's Type L controllers. In order to distribute over several sets of contacts the arcing caused by opening the circuit, the circuit is opened at several points at once as at contacts No. 1 and No. 6 in the diagram mentioned. This arrangement provides several so-called series breaks and reduces the burning due to arcing at each point.

Fig. 8 shows a simplified diagram for an open-circuit controller. It is seen that in passing from the last series point to the first parallel point that the circuit is opened at the *T*, 15 and *E* contacts, and when closed again additional resistance is cut in to limit the current per motor to the accelerating value. This controller has five series and five parallel points and is designed to use five groups of parallel regulating resistance. One of this controller's disadvantages is the sudden jerking in the operation of the car when passing from series to multiple because the current is entirely shut off from the motors and the acceleration is stopped momentarily and then suddenly applied. This is uncomfortable to passengers and also throws an additional strain on the equipment. Another disadvantage is the burning of the contacts. The accelerating current is the largest that a controller has to handle under ordinary conditions, and as this type of controller has to open this maximum-current at every operation, it burns more than some other types.

### Short-Circuited Motor Transition

Referring again to Fig. 7, if in making the change from series to parallel part of the regulating resistance is reinstated in the circuit by opening contacts Nos. 3, 4 and 5 after having been cut out for full series operation, and immediately following this the negative side of No. 1 motor is connected to ground by closing contact

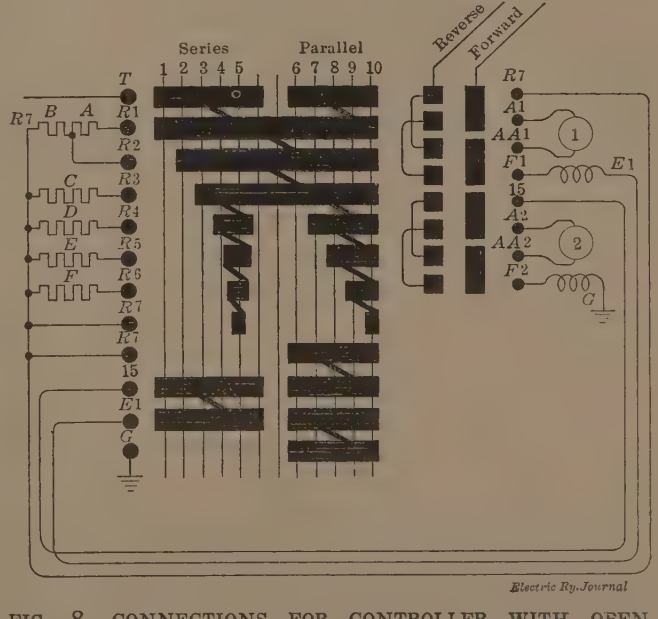



FIG. 8—CONNECTIONS FOR CONTROLLER WITH OPEN CIRCUIT TRANSITION

No. 7, we have No. 2 motor short-circuited. The next step in the transition is to open contact No. 6 and then close No. 8. This connects the motors in parallel with resistance groups *B*, *C* and *D* in the circuit. This way of changing the motors from the series to the parallel combination is termed the shunted motor or short-circuited motor method, and its sequence of connections is intended to overcome the stated disadvantages of the open-circuit method. Its disadvantage however, com-

pared with the open-circuit method, is that a sudden rise in voltage is liable to occur on the first motor because that motor is in circuit for a short time with the resistance that is afterward used with both motors. Short-circuit transition changing from series to parallel is embodied in the design of the General Electric Company's Type K controllers. Fig. 9 shows a simplified diagram for the K-11 controller. This controller has five series and four parallel points and uses four groups of series regulating resistance.

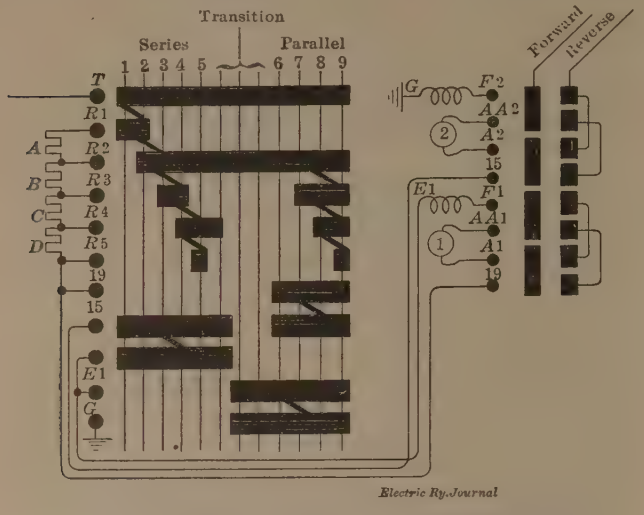
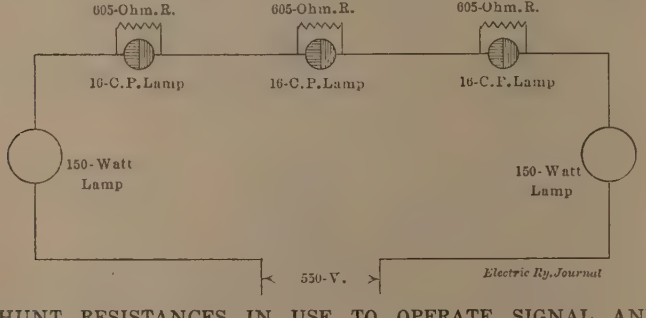



FIG. 9—CONNECTIONS FOR K-11 CONTROLLER

## Shunt Resistances Used to Operate Signal and Lighting Lamps on One Circuit

BY J. G. KOPPEL, ELECTRICAL SUPERINTENDENT OF BRIDGES SAULT STE MARIE, MICH.

On a swing bridge used by an interurban electric railway, it was recently necessary to wire up both the navigation signals lamps and the illuminating lamps from the 600 volts d. c. traction circuit. The three signal lamps comprise one at each end and one at the center of the bridge, all of 16-cp rating. For illumination at each bridge end, however, one 150-watt lamp was chosen. The latter two lamps are so arranged that the operator may see the end rails from his cabin, which is located above the track at the center of the bridge.



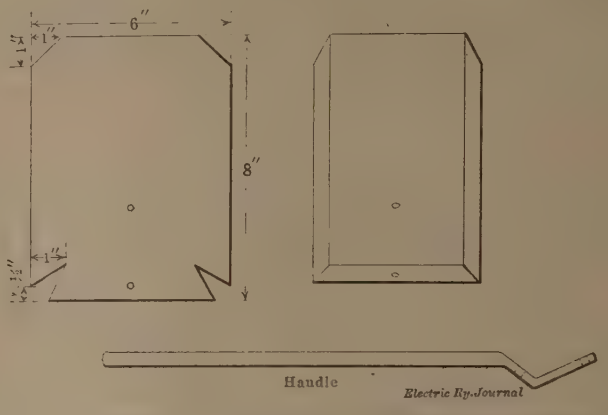

SHUNT RESISTANCES IN USE TO OPERATE SIGNAL AND LIGHTING LAMPS ON A RAILWAY CIRCUIT

To save conduit and labor in placing all lamps the two 110-volt, 150-watt lamps were wired in series with the three 110-volt, 16-cp lamps to form one circuit on the 600-volt line. However, attention was called to the point that the 150-watt lamps alone would not work in series with the 16-cp lamps. The trouble was overcome by placing a 605-ohm ½-amp resistance in shunt with each 16-cp lamp, as shown in the accompanying diagram. In operation this circuit has proved very satisfactory.

## A Serviceable Coal Shovel for Car Stoves

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD (ILL.) & INTERURBAN RAILWAY

A good serviceable fire shovel for cars using stoves is very easily made from scrap to be found around any railway shop. The blade of the shovel is made from pieces of 16-gage dash iron, cut as shown in the accompanying diagram, and then bent so that the corners come together. The handle can be made of any scraps of ½-in. or ⅝-in. round iron flattened at the end to permit riveting to the blade, or it can be made of pieces of flat iron if the latter are not too heavy. These shovels will give better satisfaction than most of the shovels that can be bought and their cost is about the same. We used these shovels last winter with good results.




CAR STOVE SHOVEL MADE BY THE ROCKFORD & INTERURBAN RAILWAY

## Comparative Merits of Motor Bearings

BY R. H. PARSONS, ELECTRICAL FOREMAN

Varied opinions are held as to the use of bronze versus iron-shell and axle bearings, some being greatly in favor of bronze and others still clinging to iron. In this article is it intended to set forth a few points for and against each, as both have their advantages.

The iron bearings consist of a heavy shell of cast or malleable iron, and in some instances of cast steel with a heavy lining of babbitt. The cast shell is cheap, the malleable a little more expensive and more durable, and the cast steel is still more expensive and more lasting, but it has the disadvantage of warping with heat, especially when babbitting. The iron-shell bearing is found to a great extent in the older type motors for which they are perhaps more economical because the conditions for accuracy and uniformity are unfavorable.

The bronze bearing includes a composition of 84 per cent copper, 12 per cent tin, 3.5 per cent zinc and 0.5 per cent lead, with a much thinner wall, lined with a light coating of babbitt. This bearing has come into almost general use in modern motors and, as built for them with all parts machined, standardized and fitted accurately, they give excellent results.

Generally speaking, the advantages found in the bronze bearing are many. An important one is that very little babbitt is necessary; and if by heating or by neglect the bearing is worn through the babbitt, the bronze makes a good wearing surface for the shaft. No harm is done, therefore, unless the wear is sufficient to allow the armature to strike the pole pieces. An iron-shell bearing, however, requires quite a thickness of babbitt to guard against this danger, for if the babbitt wears through the shaft would be running on iron. Since the inner side of these shells is made rough purposely to grip the babbitt, the result would not be good.

But the main point in favor of a bronze bearing is in the babbitting. It is a simple matter to tin the inside of a bronze bearing. Then when the babbitt is poured it adheres to the bronze to make a perfectly tight lining. On the other hand, it is difficult if not impossible to make the babbitt tight in an iron shell.

Even when much care is used in babbitting iron shells, as by heating them before pouring the babbitt, it will often be found that the cooled babbitt is loose in the shell. Again, the babbitt sometimes appears tight following the boring and installation, yet it will be found loose after running a short time. It may not be loose enough to rattle, but not much of a crevice is needed to permit the leakage of oil, and thus make an opportunity for a hot bearing.

Some wear between the outside of the bearing and the inside of the motor shell or housing is bound to come. A bronze bearing will take the greatest wear itself, saving the motor, but if the bearing is of iron the motor housing will be worn appreciably after a time, although the bearing will receive some wear, too. This is a point to be considered, as bearings are a small item as compared to paying $18 for a new housing for a box-frame motor, $175 upward for new shells, or reboring old shells at $15 or more each to take larger bearings. The reboring of shells itself is not an expensive job, but involves so much other work that the cost is often considerably increased. Shells must be stripped, fields and armatures overhauled, new dowels or keyways fitted for bearings, and new bearings of a larger size purchased, upon which follow the reassembling of the motor and the labor of removing from and replacing in the car. The cost depends on how much and how thoroughly this work is done. A special machine costing $500 to $600 is also necessary for the work. Hence, if bronze bearings will help extend the life of the shell or housing, they are well worth consideration.

The question of space often counts to a great extent in the choice of bearings. If the space is small the use of iron bearings would be impracticable because the lining necessarily would be thin, would be difficult to make and keep tight, and would be a source of danger from wearing through. This objection would apply to new motors where space would determine the size, or where it might be decided to use larger axles or armature bearings than those for which the motors were designed. In such instances bronze bearings could be used to advantage.

The first cost of the bronze bearing is about three and one-half times the cost of iron bearings, and under the same conditions the life of the iron bearing would be about double. The iron bearings will last say 600,000 miles while the outside wear will make it necessary to scrap the bronze bearing after a service of 300,000 miles, depending on the condition of the motors in which they are used. Against this the scrap value of the bronze bearing is as much as 10 cents to 14 cents per pound, depending on individual conditions, while the scrap value of the iron bearing is practically nothing.

The cost of babbitt enters also into any comparison because the iron bearing requires much more babbitt. This condition demands that a much larger stock of babbitt be kept on hand and continually turned over, thus giving greater opportunities for losses.

### OTHER BEARINGS

Some roads have adopted non-babbitt bronze bearings for all motors, the bronze being made to certain specifications while the manufacturer contracts to take back the scrap at a value per pound probably 50 per cent lower than the original cost. In this way the bearing cost after the original installation would be the difference between the first cost and the scrap allowance. However, one point clear in this proposition is that if the bearing is not rebabbitted it must be turned into scrap when the bearing surface has worn enough to give the armature shaft vertical play. The limit would probably be 1/16 in. Therefore, for this 1/16-in. wear the bearing must be paid for at a rate of about 12 cents per pound for the whole bearing. The redeeming feature of this proposition is the entire elimination of the cost of babbitt, the labor for handling same, etc. This plan of handling the bearing problem has been taken up in a few places, but its success is not yet assured enough to encourage general adoption.

One or two roads have adopted to some extent cast-iron bearings without any lining, and these have been found to give some degree of satisfaction. While running a steel shaft against a cast-iron bearing undoubtedly would be successful for light service, assuming abundant lubrication, the result in case of heating would be far worse than with either a bronze or cast-iron babbitted bearing. Such a bearing would be very apt to freeze to and cut the shaft badly, would tend to destroy the dowel pins or keys, and would lead to the skidding and flattening of the wheels.

A solid babbitt metal bearing has been used by a few companies, but the results obtained are questionable.

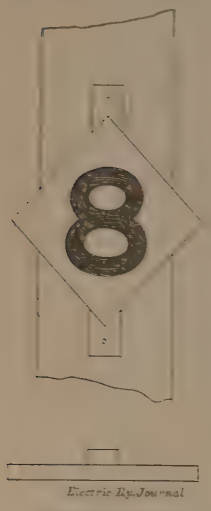
Ball bearings for railway motors are being tried out in many places, but they have not yet reached that stage where they will supplant the ordinary oil bearing. For standard cars their saving in friction is not great enough to be a deciding point in their favor, while the lubrication of modern plain bearings has reached a degree of efficiency that does not make it necessary to use ball bearings just for the protection of the armature. However, the use of ball bearings in the motors of automobile and storage battery cars has proved that they are practicable in other respects than energy saving as they allow a closer design of the motor, permit less clearance of pole pieces and give a superior wear which keeps the gears, pinions and brushholders in better alignment. In general, ball bearings for motors fitted for plain bearings involve special designs and installation costs of $60 to $100 for motors of say 60-hp capacity. Their excellent service in storage-battery motors warrants the extra cost for the self-propelled car, but their advantages for larger motors of standard cars are not so decisive. Motors originally designed for the use of ball bearings would not necessarily cost much more on account of special design, but the price of ball bearings themselves is four or five times the cost of bronze bearings, and their life, without repairs, would not be longer if as long as that of a bronze bearing.

## Effect of Impact Resulting from Flat Wheels

A test is being conducted by the mechanical engineering department of Purdue University, Lafayette, Ind., to determine the effect of the impact resulting from flat wheels. These tests cover flat spots of various sizes on wheels carrying definite loads and running at definite speeds. It has been found that an imperfect wheel with a 3-in. flat spot strikes the track with an impact of 104,000 lb. when the car is going 16 m.p.h. and is carrying a load of 20,000 lb. It was also found that under similar conditions a flat spot only 1½ in. in length produced a blow of 20,000 lb., and the impact for spots 2 in. long was 25,000 lb. A standard freight car was mounted in the test laboratory and special apparatus, including an instrument which photographed the magnitude of the blows, was employed to collect test data.

## Standard Way Signs Approved by Connecticut Public Utilities Commission

In the inspection of electric street railway lines operated in the State of Connecticut, the Public Utilities Commission found that no uniform system of signs governing the operation of cars had been adopted by the various companies. The commission believes that this lack of uniformity creates confusion on the part of the general public desiring to board or alight from cars and in some cases it may be a possible element of danger. It therefore approved on Oct. 27 as of Oct. 1, 1914, a standard for station, stop, speed limit, slow, warning and whistle signs, as shown in the accompanying drawings. The commission orders and directs the use of such signs by all electric street railway companies operating in the State of Connecticut not later than April 15, 1915. The details of each sign follow:

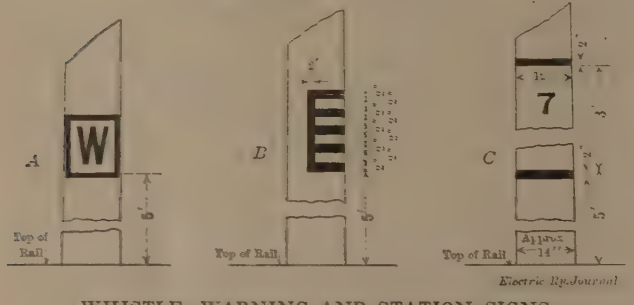



SPEED LIMIT SIGN

*Stop*—Face red, letters black, back black.

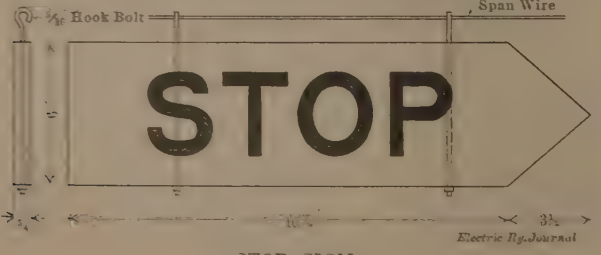
*Slow*—Face yellow, letters black, back black.

*Whistle*—White field, black band, black letter.



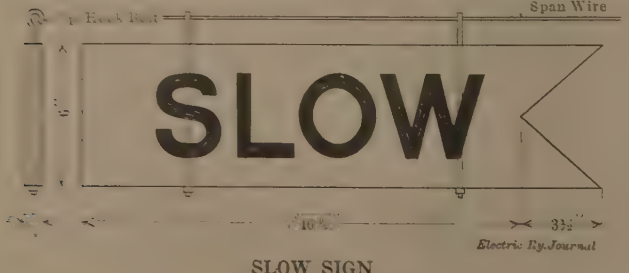

WHISTLE, WARNING AND STATION SIGNS

*Speed limit*—Face yellow, figures black, back black. Dimensions: Vertical diagonal of board, 13 in.; horizontal diagonal of board, 12 in.; thickness of board, ⅞ in.; height of figures, 6⅞ in.; nailing strip, 17 in. x 2 in. x ⅞ in.; distance from top of rail to sign, 5 ft.




STOP SIGN

*Warning*—White bars on black field; four poles away, four bars; three poles away, three bars; two poles away, two bars; one pole away, one bar.

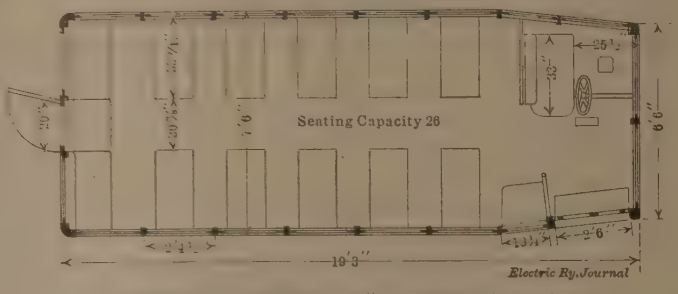



SLOW SIGN

*Station*—White band, black rings, black figure.

## Cleveland Motor Bus for Traffic Development

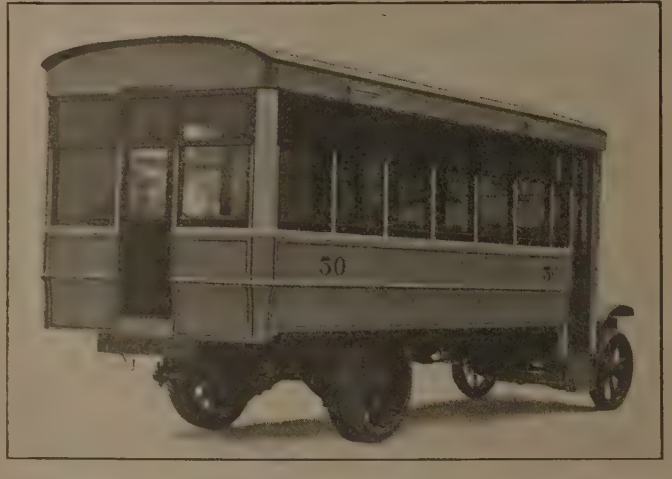
The Cleveland Railway, in acceding to a recent demand for an extension of its lines into a sparsely settled suburban district, substituted motor omnibuses for track and cars. After surveying the territory from which the demand for an extension came, the company had decided that a track extension could not be operated profitably. On the other hand, if some form of transportation service was rendered, it was quite certain that the territory would develop rapidly and soon reach a point where a street railway service could be furnished at a profit. The installation of the motor bus instead of the street car satisfied the community, and even if operation is at a slight loss, or expenses only are made for the time being, the change in policy represents a saving.




CLEVELAND MOTOR BUS—GENERAL PLAN

Three buses were put in operation on Sept. 1, two of which are used in regular service and one is kept in reserve. Since they have been in operation only a short period, complete operating data are not available. The earnings have averaged 24 cents per bus-mile; the platform expense for twenty-six seated passengers has been 30 cents per hour, or about 6 cents per bus-mile. These buses are used in two suburban districts, one in East Cleveland and the other in South Brooklyn, a suburb of Cleveland. The schedules cover an approximate half-hour service.

An exterior view and a floor plan of one of these buses are shown in the accompanying illustrations.




CLEVELAND MOTOR BUS—EXTERIOR VIEW, SHOWING NORMAL NEAR-SIDE ENTRANCE AND EXIT AND EMERGENCY REAR EXIT

A double folding door at the front right-hand corner provides entrance and exit to the body. This door is operated from the chauffeur's seat. The mechanism which opens and closes the door also raises and lowers the step. An emergency door at the center of the rear end of the bus is fitted with a mechanism to permit opening by the passengers. The general dimensions of the body are as follows:

| | |
|---|---|
| Length over corner posts | 19 ft. 3 in. |
| Width over sills and panels | 7 ft. 3¼ in. |
| Width over posts | 7 ft. 6 in. |
| Center to center of side posts | 2 ft. 4½ in. |
| Height from top of floor over roof | 7 ft. |

The body is built with an oak bottom framing reinforced with structural steel channels, and the body framing is of ash. Heat is furnished by four Garrison heaters, connected to the engine exhaust and provided with valves for regulation. Four Perry ventilators are also fitted into the letterboard, two on each side of the bus. Two lamp circuits, one over the center of each row of cross-seats, have sockets for 6 cp and 8 cp lamps. These circuits are connected to a storage battery installed at the chauffeur's seat, and to a generator mounted on the chassis. The body is also equipped with hand straps and push-button buzzer system. These buses were designed and built by the G. C. Kuhlman Car Company, Cleveland, Ohio.

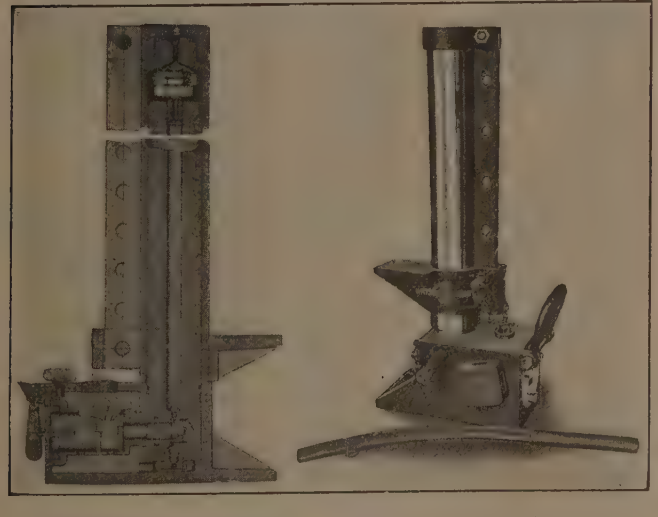
## Hydraulic Emergency Jack

The Watson-Stillman Company, New York, has just brought out a new type of hydraulic jack. Primarily the design was intended as an emergency jack for electric railway use, but it will be welcomed by any shop or factory where lifting work is performed. As shown in the accompanying cuts, the following unusual features are embodied in this jack.

The claw can be moved vertically and adjusted to the most convenient height and, with the cylinder, can be swung in a complete circle without changing the position of the jack or of the pump level.

The cylinder is the moving part of the jack instead of the ram, as in the ordinary jack, thus allowing the pump mechanism to stay in a fixed vertical position and permitting the working parts of the jack to be made simpler and more compact.

The piston is packed with leather rings; the valves



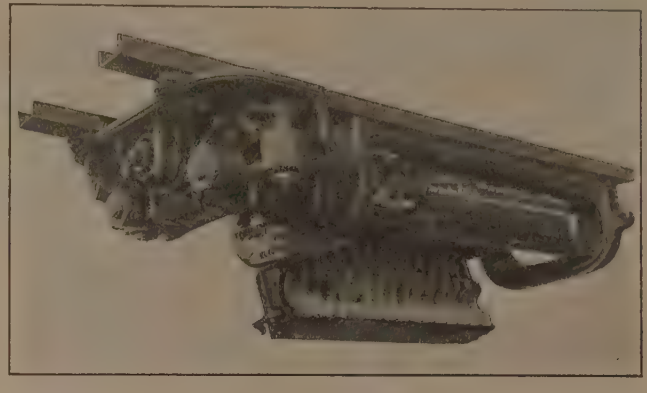
HYDRAULIC EMERGENCY JACK IN SECTION AND COMPLETE

are of the ball type, and all passages are made so large that the construction is practically foolproof.

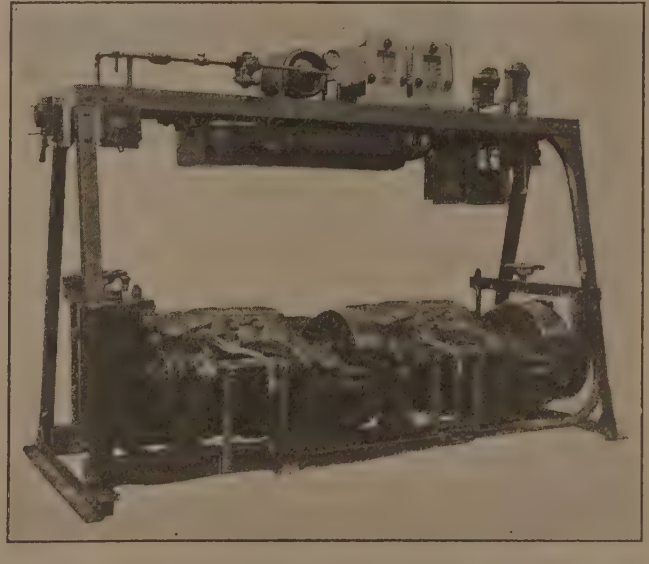
The release of the pressure is by a key operating a small needle valve. Again, while the operating lever is but 18 in. long one man weighing 125 lb. can obtain the maximum pressure with but slight effort. The lever is made curved in shape and the socket has a hole in each of its four sides to allow convenient operation from practically any position. These jacks are operated with a special oil, which, besides acting as a lubricant, prevents rust on working parts, avoids freezing and does not injure the packings. These jacks are now built in 5 and 10-ton sizes with a ram stroke of 10 in. They are guaranteed to stand a 50 per cent overload without detrimental effect to any of their parts.

## Unit Switch Control for Platform Type Controllers

To get the many advantages of remote control and yet utilize the existing platform controllers, a very satisfactory pneumatically operated device known as the PK head was brought out some time ago by the Westinghouse Electric & Manufacturing Company for attachment to a standard platform or K type of controller. The head is controlled from the master controller mounted on the platform, thus making possible the mounting of the K controller horizontally under the car with the head attached. A line switch also mounted under the car acting as a circuit breaker and containing two individual unit switches opens the main circuit, thus removing all heavy current-carrying parts from the platform. In the case of double-end control one of the K controllers is removed from the car entirely.



K-TYPE CONTROLLER AS MOUNTED UNDER THE CAR



VIEW OF UNIT SWITCH CONTROL COMPLETE ON EXHIBIT RACK

The essential feature of this equipment is the PK pneumatic operating head which consists of air cylin-

ders with pinion and rack mechanism which rotate the K control drum notch, governed entirely and accurately by the motorman who manipulates the master controller on the car platform.

The apparatus possesses the very decided advantage of introducing a time element in the drum rotation or progress of the K controller. In other words, while it may be rotated or advanced to full series or multiple as rapidly as any operating condition demands, it advances to these positions with a reasonable and desirable time element. This makes it impossible for a motorman deliberately to abuse the equipment. The K controller is employed merely as a commutating switch with a closed circuit, bringing in and cutting out the various resistance steps, but through the cycle of series-parallel operation the drum does not make or break the main circuit. In this way wear and tear on the contacts are eliminated and the danger of welded contacts is removed. This "making" and "breaking" is cared for by the auxiliary two-unit line switch previously mentioned.

The equipment is designed to operate on a maximum air pressure of 70 lb. but will operate at a minimum of 50 lb. of compressed air obtained from the brake system. The master controller is small and compact, and controls the movement of the PK head and consequent acceleration of the car. It is operated, as far as the motorman is concerned, like a type K controller, so that no special instructions are necessary. The line switch, in connection with an overload trip mounted on one of its end frames, takes the place of the usual car circuit breaker. In case of overload or short-circuit the overload trip relay opens the two switches of the line switch and thus cuts off power. Whenever the overload trip operates the line switches cannot be closed again until the trip has been "reset" by moving the control switch to the "reset" position, first placing the master controller in the "off" position, thus preventing abuse by closing the circuit breaker with the type K controller on any running position. When two or more cars are coupled in a train, the PK head on each will operate simultaneously under the direction of the selected master controller in the train.

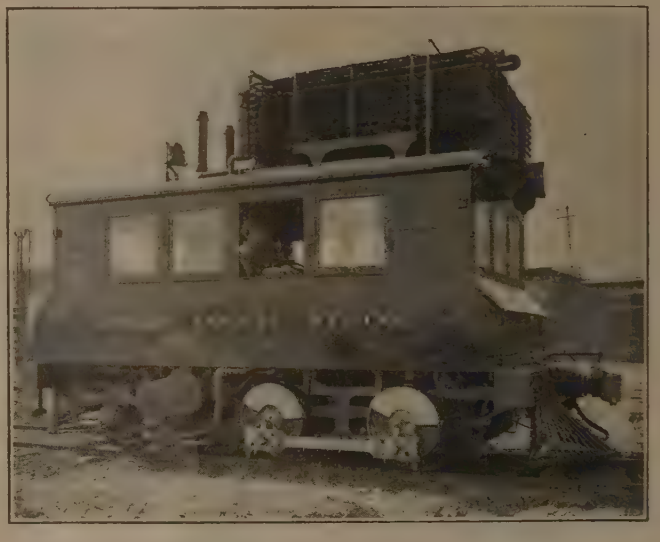
After exhaustive tests on trial equipment this type of control was selected by the Third Avenue Railway, New York, as it successfully met the demands of equipment space limitations and insured perfect safety to passengers. It is also used on 125 cars of the New York City Railway's Broadway division, which has unquestionably the hardest street railway service in the United States.

## Gasoline Switching Locomotive for Motley County Railway

The Motley County (Tex.) Railway recently purchased a 300-hp gasoline switching locomotive from the McKeen Motor Car Company, Omaha, Neb. The locomotive made the trip from Omaha to Matador, Tex., under its own power. It is used in freight and switching service between Roaring Springs Junction on the Quanah, Acme & Pacific Railway and Matador, Tex. This locomotive has a tractive effort of 12,000 lb. at 6 m.p.h. The motorman's position in the center and on the right side of the locomotive with an uninterrupted view in all directions, together with the air-reverse control, is far superior to the steam locomotive for signal observation owing to the absence of boiler and tender. Of the general features only the cab resembles the 200-hp locomotives built by the McKeen Motor Car Company, the 300-hp design being in the 0-4-2 class.

The frames are of cast steel and the driving wheels 42 in. in diameter. The usual locomotive spring suspension with equalizers is used. The engine bed is a steel integral casting which forms an efficient brace and reinforcement in tying together one side frame to the other. The all-steel cab covers the entire length of the locomotive frame between the bumper beams and is so bolted to the frames and buffer beams as to add very materially to the strength of the locomotive. The headlights are operated by acetylene. The straight air brake is used on the locomotive, which has a Gregory brake valve to permit the operation of automatic brakes on the train.

The diameter and stroke of the 300-hp six-cylinder engine is 11 in. and 15 in. respectively. Its general design and details correspond to the manufacturer's latest model (foolproof) Type C engine, which is notable for increased water circulation around valves and cylinder heads; tungsten steel valves; piston triple rings; special compound hardened cams; faultless magneto; water-jacketed intake pipes; inclosed flywheel, crankcase and camshaft, water and air pumps driving mechanism; combination splash and automatic lubricating system; gears of herringbone type. Among the new characteristics is the use of two exhaust pipes, which extend



GASOLINE SWITCHING LOCOMOTIVE USED BY MOTLEY COUNTY RAILWAY

through and above the roof. The engine has an air-reversing mechanism which adds materially to the convenience and ease of the motorman. Two 5-in. air compressors are attached to the engine crankshaft, in addition there is an auxiliary air compressor in the cab for emergency service.

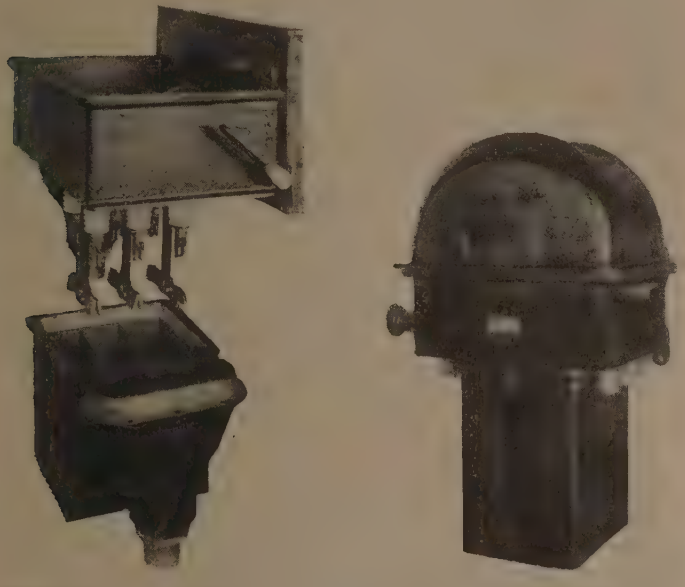
The ends of the front or main driving axle and rear driving axle have counterbalance crank disks which are connected by side rods. The power transmission, pneumatically operated, is effected by means of a sprocket on the crankshaft, through a Morse chain to a sleeve working free on the rear driving axle and is then transferred through a multiple disk friction clutch, from which it is delivered by a Morse chain to the forward driving axle where, by another clutch, the power is either magnified by a series of gears to produce heavy tractive effort and high torque for starting purposes, or is delivered direct to the driving wheels. By thus magnifying the torque of the internal combustion engine great starting effort is obtained for this style of locomotive. At the same time when the locomotive is once in motion, higher economy is obtained by cutting out the gears and operating the direct connection. The general dimensions of this locomotive follow:

| | | |
|---|---|---|
| Driving wheels, diameter | 42 | in. |
| Driving wheelbase | 4 ft. 8 | in. |
| Total rigid wheelbase | 12 ft. 0 | in. |
| Length over bumper beams | 19 ft. 6 | in. |
| Length between pulling faces of couplers | 22 ft. 5½ | in. |
| Length over all | 22 ft. 11½ | in. |
| Height, rail to top of exhaust pipe | 13 ft. 3 | in. |
| Height, rail to top of cab | 10 ft. 8 | in. |
| Width over cab | 9 ft. 8 | in. |
| Width over cab eaves | 10 ft. 0 | in. |
| Center to center of frames | 6 ft. 9⅛ | in. |

## Oil Switches for Manhole Service

Two new types of manhole oil switches for mounting on flat vertical surfaces have recently been developed by the General Electric Company. One of the switches is for operating by hand and the other by a solenoid, which is an integral part of the switch. They can be used in locations where there is danger of flooding.

In the hand-operated switch there are two bell chambers through which run the leads to and from the switch. This chamber is of the usual construction and, after the leads are connected to the switch terminals, is filled with an insulating compound and made air tight. The bell chambers, as well as the oil vessel and cover, are cast iron. They are bolted to the cast-iron switch frame, the joints being made watertight by gaskets.



MANHOLE OIL SWITCHES FOR HAND AND SOLENOID OPERATION RESPECTIVELY

The operating handle is outside the frame and can be operated by a hook from the entrance to the manhole. The shaft handle passes through a stuffing box.

The solenoid-operated switch as a rule is operated from the central station by the usual control switch located in the station. The mechanism is especially simple, the plunger of the solenoid being connected direct to the crosshead attached to the operating rods. The switch solenoid uses current only while the switch is in the act of closing or opening by means of the tripping coil. The switch is held closed by a catch, which allows the switch to open by gravity when the catch is thrown out of position either by the trip coil plunger or by a small tripping lever located outside the switch frame.

Both hand and solenoid-operated switches have an indicator, which can be seen from the top of the manhole and shows whether the switch is open or closed.

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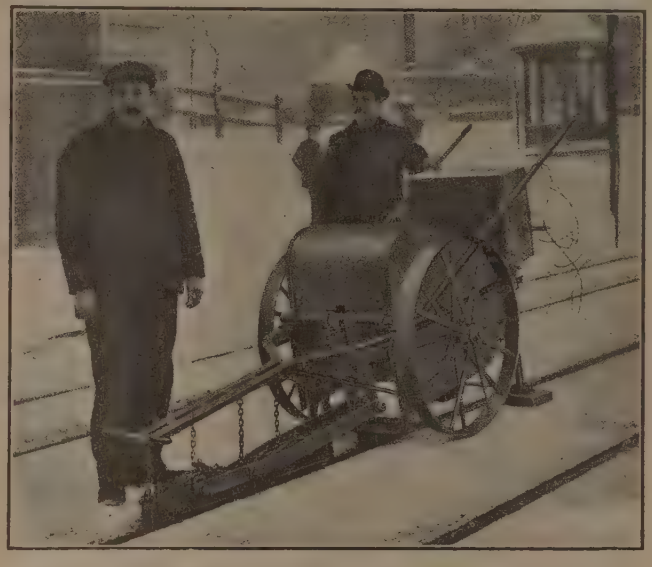
Transite backing has been found a good insulation for the supports of controllers, motors and starting boxes mounted on the steel columns or other metal structures of electric railway shops.

## A Light Rail Filing Machine

A light, portable rail filing machine for filing cupped rail joints, corrugations and other rail-head defects has recently been introduced by the U. S. Metal & Manufacturing Company after extended use abroad. A view of this machine as actually used at Trondheim, Norway, is reproduced herewith.

Stress is placed by the builder on the tilting feature which permits bringing the file plane to bear upon and to be raised from the rail in such simple fashion that the work can be undertaken while the cars are running.

The frame of the machine is supported upon two iron wheels. The driving motor and gear are mounted upon the frame. The motor acts by means of a driving rod upon a two-armed swinging lever, on the lower end



PORTABLE GRINDER IN USE AT TRONDHEIM, NORWAY

of which the thrust rod for the file plane is mounted. On the frame a lifting arm or boom projects toward the front, on which arm the file planes are suspended by means of chains. At the rear of the wheels are two supports which can be raised or lowered. If the supports are lowered the rear of the machine is raised and the boom tilted toward the rail in accordance with the bearing surface pressure required upon the file planes.

Extra weights can be attached to the file planes when hard rails are to be filed. The starting box and tool box are located at the rear of the machine, between the handles. Either files or carborundum may be employed in filing the rails.

The maximum stroke of the file planes is approximately 19 in.

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## Boston Subway Entrances and Exits

The Boston Finance Commission has recommended to Mayor Curley that the size of the Cambridge subway entrances and exits on Tremont Street, Boston, be reduced in height and length, subject to the approval of the Boston Transit Commission and the Boston Elevated Railway. The board recommends that the entrance be rebuilt to conform to the type of stairway covering in use at Central Square, Cambridge, and that the escalators be changed to a uniform design. In advices received from the Boston Transit Commission the finance board was informed that the exposure of the escalators to the weather is undesirable on account of injury to the machinery and interference with operation, but the latter board is of the opinion that the size of the coverings can be further reduced without danger to the service.

# News of Electric Railways

## RICHMOND FRANCHISE GRANT

### Company Desires Thirty-Year Grant—Fare Readjustment Asked—Arbitration of Disputes Suggested

As previously noted in the ELECTRIC RAILWAY JOURNAL the Virginia Railway & Power Company, Richmond, Va., has submitted to the City Council a petition and draft of an ordinance under which it offers to surrender its various franchise grants and accept a thirty-year blanket franchise in their place. The present grants have thirteen to fifteen years to run. In its letter of transmissal to the Council the company says that it is to the interest of both the city and the company that the company be granted the right to occupy the streets upon clear and definite terms with one grant covering the whole territory and that the provisions of the grant be as liberal as consistent with the public interests and the retention of proper control and supervision over the streets to the end that the service may be rendered at the lowest operating cost. The company says that the varying dates of expiration of the existing franchises will be a source of embarrassment to the city and that they are already causing inconvenience to the company in perfecting financial arrangements and in the administration of its properties.

The company has prepared a form of ordinance which it is believed will accomplish the results desired. This ordinance is merely a rough draft, in which the effort has been made to conform as far as possible to the provisions of existing ordinances, the idea being to have the draft ordinance as presented constitute a basis for discussion and consideration by the proper committee and by the Council.

The only mortgage lien upon the properties of the company in Richmond is the mortgage of the Virginia Railway & Power Company, dated July 1, 1909, given to secure an issue of $15,000,000 of bonds. Under this lien the company is authorized, with the consent of the trustees, to surrender its franchises and accept in lieu a new grant. Property recited in detail in the draft which the company proposes to transfer and convey to the city is at present valued in excess of $1,000,000. Under existing conditions the company is required to grant a 5-cent straight fare, sell six tickets for 25 cents, provide tickets good between 6 a. m. and 7 a. m. at 2½ cents each and furnish tickets to pupils attending schools and colleges at 2½ cents each. As a result of these rates and the system of transfers in vogue a passenger can ride from any point in the city to practically any other in the city or its suburbs for 4 1/6 cents and at certain hours of the day for 2½ cents. The average fare for passengers carried is 3 cents.

After reciting briefly the conditions under which the rates of fare were fixed and referring to the cost of labor in the various departments of the company for 1914 as compared with 1896 and 1900, the company says:

"It follows from these figures that if the rates of fare fixed in the franchises granted in 1896 and 1900 were reasonable and just, they must be unreasonable and unjust to the company at the present time, when the average length of haul per passenger has practically doubled through growth of suburban territory, and the cost of everything entering into the transportation has increased in excess of 50 per cent, while the rate of fare per passenger carried has actually decreased."

The ordinance submitted by the company suggests no rate of fare. The statement is made that it is hoped that the fares may be fixed upon a basis which will be just not only to the company but enable it to finance its requirements upon a basis favorable to the public and to the public service. It is suggested that provision be made for the readjustment of fares from time to time as changed conditions may require. The company was required under its franchise to pay to the city in 1913 in taxes a total of $179,076, or an amount equal to interest at 4 per cent for the year on approximately $4,500,000. In addition the company sustained a loss on account of the special 2½-cent fare in the morning. In short, the company paid the city in direct taxation and in charges for the benefit of the public an amount in excess of 12 per cent on its gross railway earnings within the city. In addition to this it is required to pay the State franchise tax and the federal income tax. The total taxes and licenses paid by the company in all jurisdictions for the year ended June 30, 1914, was $308,111, which is an increase of $33,522 over the preceding year. This increase is continuing for the present year at the same ratio.

It is suggested that in addition to the payments for paving and repairing the new ordinance provide a tax upon gross receipts in lieu of all other charges. Arbitration is suggested as the method best suited to disposing of such questions as may present themselves for settlement under the grant.

## THE CLEVELAND RAPID TRANSIT FRANCHISE

Lack of a quorum is believed to have prevented the Council committee of the whole at Cleveland, Ohio, from going on record in favor of the amended franchise ordinance of the Cleveland Rapid Transit Company on Nov. 20. Councilman Gahn advocated a plan of fixing the purchase price for the city by arbitration. Mayor Baker opposed this plan and said further that a bond to guarantee the beginning of work on the subway within a specified time, suggested by Dr. Charles S. Howe, the president of Case School of Applied Science, would be of little value. He suggested that the ordinance be so amended as to require the expenditure of a certain amount on construction each year. Data collected by City Engineer Hoffman showed that the cost of building the tunnel would be about $551,179 per mile of single track.

At the meeting of the committee on Nov. 18 Dr. Howe charged the company with dilatory tactics and suggested that it be compelled to give a bond of $1,000,000 to insure its commencing work on the subway within the prescribed time. W. R. Hopkins, president of the company, said:

"We not only have not asked for favors, but have rendered a great public service in working out the subway plans. The general idea that we are nursing along something valuable is tragic, it is so untrue. The moment the city indicates that it does not want a subway system, I am ready to quit."

Allen T. Burns, head of the Cleveland foundation survey, suggested that the city retain the right to allow other companies to use the subway. Mr. Hopkins agreed to have this section of the ordinance rewritten. During the debate Mr. Hopkins stated that the idea of building a subway was Tom L. Johnson's and that Mr. Johnson had asked him to go into it as a citizen. He drafted the original ordinance. Everything in relation to the matter has been open and those interested in the amended ordinance may secure any information desired. Now, however, it is his desire, if the city wants the subway, to go before financiers with as nearly a unanimous vote of Council as possible, that they may know that Cleveland really wants faster transportation.

At a meeting of a number of business men with O. C. Barber, Barberton, Ohio, in the law offices of Goulder, Day & White, a proposition to build a freight subway under East Fifty-fifth street to connect the lake front with the upper Cuyahoga Valley was discussed.

## SUBWAY LABOR TROUBLES

The Public Service Commission for the First District of New York has adopted the plans and form of contract and began advertising for bids, to be received and opened on Dec. 11, for the construction of Section No. 4 of Routes Nos. 4 and 36, that part of the new Broadway subway in Manhattan extending northerly under Seventh Avenue from Fifty-first Street to a connection with the crosstown part of the line in Fifty-ninth Street.

During the week ended Nov. 21 the Oscar Daniels Company, contractors for Section No. 1 of Route No. 18, suspended work on that contract on account of an acute situation which had arisen in regard to the employment of

aliens on the work. The New York labor law provides that on public works no non-citizens shall be employed. Recently the Bricklayers and Masons' Union made complaint to the Public Service Commission that various contractors on the new subways were violating the labor law in this and other particulars, and on Nov. 12 sent letters to several contractors notifying them of such violations and demanding immediate compliance with the law. As the law provides for the forfeiture of a contract in case its provisions are violated, as well as for punishment for misdemeanor, the Daniels Company felt unwilling to take the risk which a continuance of work might bring, especially as a large number of its employees were not citizens. Accordingly, it announced the suspension of work. Meanwhile the Public Service Commission and the subway contractors generally are giving serious consideration to the situation, with the hope that some means may be found to continue work on all contracts. Various contractors have informed the commission that they regard it as impossible to get a sufficient number of American citizens to carry out their contracts, especially in excavation work. A complaint by John Gill, business agent of the Bricklayers and Masons' Union, against the Dock Contractor Company, alleging violation of the labor law, is pending before the commission.

## RAILWAYS UNITE AGAINST MAIL RATE LEGISLATION

The Western Association of Short Line Railroads was organized in San Francisco on Nov. 16, when thirty representatives of short-line railroads in California, Arizona, Nevada and Idaho met to consider their common interests in the proposed reduction of rate of payment for carrying United States mail, and their dealings with the Interstate Commerce Commission. It was agreed that all of the smaller railroads in California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Arizona and New Mexico should be asked to join the association. Officers elected at the meeting were: D. M. Swobe of the McCloud River Railroad, president; L. G. Cannon of the Nevada Northern Railroad, first vice-president; D. L. Bliss of the Lake Tahoe Railroad, second vice-president; C. M. Oddie of the Nevada Central Railroad, secretary,

The directors are: For three years—D. M. Swobe of the McCloud River Railroad, R. K. Minson of the Arizona & New Mexico Railroad, L. G. Cannon of the Nevada Northern Railroad. For two years—D. L. Bliss of the Lake Tahoe Line, E. N. Heigho of the Pacific & Idaho Northern Railroad, and C. M. Oddie of the Nevada Central Railroad. For one year—R. M. Cox of the Nevada-California-Oregon Railroad, E. O. Burns of the San Diego & Southeastern Railroad, and a representative to be chosen from the Oakland, Antioch & Eastern (Electric) Railway. The committee which is to make the contest for fair payment for carrying the mails, even to sending a representative to Washington, consists of R. M. Cox of the Nevada-California-Oregon Railroad, L. G. Cannon of the Nevada Northern Railroad, C. M. Oddie of the Nevada Central Railroad, E. N. Heigho of the Pacific & Idaho Northern Railroad, and O. W. Lehmer of the Yosemite Valley Railroad. This committee was instructed to oppose actively the Bourne bill and the Moon bill, pending in Congress, either of which will reduce the payments to the small roads by from 25 per cent to 65 per cent.

## WESTERN MASSACHUSETTS TRANSPORTATION HEARINGS CLOSED

Final hearings were concluded at Boston, Mass., on Nov. 24 by the commission on transportation in western Massachusetts, which is to report to the Legislature by Jan. 15 next upon possible means of electric railway and highway development in the Berkshire district. L. S. Storrs, C. Q. Richmond and others discussed electric railway conditions in the region west of the Connecticut River and pointed out the possibilities of supplementary service between local electric railways and steam roads. The commission will confer with the Public Service Commission and with other railroad officials before drafting its report.

## PLANS FOR RENEWING TOLEDO NEGOTIATIONS

It is expected that Henry L. Doherty, chairman of the board of directors of the Toledo Railways & Light Company, will be in Toledo during the week commencing Nov. 23 to review with his attorneys the tentative franchise recently submitted by the franchise committee.

The proposed franchise is said to contain many of the provisions of the draft prepared by Mr. Doherty early in the negotiations and also some of those offered by the Toledo Citizens' Franchise Association. Under it the company would operate at a straight 3-cent fare for one year, under a commissioner appointed by the city. At the end of that time the fare would be fixed for a term of five years, based upon the experience of the year and the value of the property, as fixed by appraisers named by the city. The fare would then be revised every five years thereafter, if necessary. The committee proposes to allow the company a 6 per cent return on its investment.

Copies of the new franchise will probably not be distributed widely until the various points at issue are thoroughly threshed out at conference between the committee and the company officials. The points upon which the company and city have already agreed will probably not be taken up again. The committee has announced its readiness to resume negotiations at any time.

## NEW SEATTLE SALE OFFER

The receivers of the Seattle, Renton & Southern Railway, Seattle, Wash., have offered to sell to the city the portion of the line within the city limits for a consideration of $200,000 in municipal railway bonds, bearing interest at the rate of 4½ per cent, and 20 per cent of the gross earnings of the property for a period of twenty-eight years. The maximum price fixed by the receivers in excess of the $200,000 bonds is $1,300,000. The original offer of the company was to sell for $1,600,000, including the initial payment of $200,000 in bonds, and an annual payment of $1,400,000, or 25 per cent of the gross earnings, for a period of twenty-five years. The Council rejected this offer but decided to submit the proposition to the voters. Corporation Counsel Bradford advised that if the voters refused the proposition the receivers could then go into the courts in the event of a condemnation case with the city, and argued that the city has estimated the value of the line at $1,600,000. The resolution of Councilman Dale, asking the city legal department to request the King County Superior Court to order the sale of the Renton line has been referred to the corporation counsel. The new offer of the company to sell will probably be referred to the Council committee of the whole.

**Cost of Electrifying Steam Roads at Cleveland.**—E. P. Roberts, smoke inspector, has completed a report of his investigation of the cost of electrifying the steam roads within the city limits of Cleveland, Ohio, and places his estimate between $20,000,000 and $30,000,000. The investigation was undertaken at the request of the City Council.

**Third Bay State Arbitrator Chosen.**—District Attorney Joseph C. Pelletier of Boston, Mass., has been chosen as the chairman and third member of the board of arbitration which will investigate wages on the Bay State Street Railway. Hearings will begin at Boston on Dec. 17. The company will be represented by Henry E. Reynolds, assistant general manager, and the employees' union by James H. Vahey.

**Boston Elevated Employees and Military Duty.**—As a result of the service required by the Massachusetts militia at the Salem fire last summer, the Boston Elevated Railway is taking a military census of its employees. Each man with military affiliations is asked to file a blank giving the essential features of his connections so that the company will have definite information as to possible requirements in emergencies which demand the use of troops. A number of employees who were on duty at the Salem fire were not only not hindered in their duties by the company, but were paid in full for time away from Boston in addition to their militia compensation.

**Trial Run of New York Municipal Car.**—On the afternoon of Nov. 24 a most successful trial run of the first New York Municipal Railway Corporation car was made in Brooklyn for a party of guests including the following: Messrs. Wood (Commissioner), Wilder and Whiston of the Public Service Commission for the First District, New York; Messrs. Hedley and Doyle, Interborough Rapid Transit Company; Messrs. Hazelton and Brinckerhoff of L. B. Stillwell and J. V. Davies of Jacobs & Davies. These gentlemen were chaperoned by Col. Williams and Messrs. Menden, Huff, Meneely, Gove, Siebert, Van Cott, Dempsey, Bullock and other representatives of the New York Municipal Railway Corporation and Brooklyn Rapid Transit System.

**Possible Change in the Ohio Public Utilities Commission.**—As a result of the recent election in Ohio Edward M. Fullington, former state auditor, and E. L. Lampson, former speaker of the House of Representatives, have been announced as aspirants for the position occupied by E. W. Doty on the Public Utilities Commission of that State. His term expires on Feb. 1, while the terms of the other two members of the commission expire in February, 1917, and February, 1919, respectively. Governor-elect Willis, however, has announced that no appointments will be announced until he has taken office. Mr. Doty is a Republican, but was appointed by Governor Cox at the request of Mayor Baker of Cleveland, both Democrats.

**Electrification Urged.**—A movement has been inaugurated by the Caldwell Commercial Club, of Caldwell, Idaho, to secure the electrification of the Wilder branch of the Oregon Short Line, extending from Caldwell to Wilder, a distance of approximately 11 miles. It is understood that the Short Line is willing to lease the property for a long term of years to responsible parties and an effort will be made by the Caldwell, Wilder, Greenleaf and Homedale commercial organizations to interest the Caldwell Traction Company in the plant. It is estimated that the cost to electrify the branch and to complete the extensions planned, together with the purchase of additional equipment and the erection of substations, will approximate $100,000.

**East Boston Tunnel Toll Situation.**—At the request of Mayor Curley of Boston, Mass., John A. Sullivan, corporation counsel, has written all holders of East Boston tunnel bonds, asking them to release the city from its pledge on the face of the bonds that the whole amount of the 1-cent tunnel tolls from passengers on the cars of the Boston Elevated Railway running in the tube shall be used to pay the principal and interest of the bonds. The letter pointed out that if the pledges are waived the city can appropriate $125,000 annually for the foregoing requirements until 1922. The act under which the appropriation is permitted was adopted by a referendum vote at the last Boston city election. There has been a general desire to abolish the 1-cent tolls, which impose a 6-cent fare upon residents of East Boston using the Boston Elevated Railway system, and to transfer the liabilities met by them to the general tax levy. If the bondholders release the city no alteration in fare received by the Boston Elevated Railway will result, as the company has turned over the tolls to the city.

**A. N. Brady's Holdings.**—The value of the estate of the late Anthony N. Brady is placed at $77,042,443 by Charles M. Friend, personal tax appraiser of Albany County, who filed his report in the surrogate's court at Albany, N. Y., on Nov. 19. Mr. Brady's holdings are particularly interesting on account of the prominent part which he played in public utility affairs. His interest in the Brooklyn Rapid Transit Company consisted of 22,029 shares appraised at $1,935,798. In addition he held $2,385,000, par value, of Brooklyn Rapid Transit 4 per cent bonds appraised at $2,101,383, and $152,000 of Norfolk & Portsmouth Traction Company 5 per cent bonds appraised at $124,196. His holdings of Interborough-Metropolitan common stock amounted to 7392 shares appraised at $116,424. The 1150 shares of Delaware, Lackawanna & Western Railroad stock which Mr. Brady owned were appraised at $221,375. His largest holdings of industrial securities were in tobacco corporations. He held 32,344 shares of American Tobacco common, valued at $6,792,240; 12,844 shares of American Tobacco new preferred, valued at $1,155,960, and 288,335 shares of British American Tobacco, Ltd., valued at $5,190,030.

## PROGRAMS OF ASSOCIATION MEETINGS

### Pennsylvania Street Railway Association

The Winter meeting of the Pennsylvania Street Railway Association will be held at the Board of Trade Building, Harrisburg, Pa., on Dec. 8 and 9. The meeting will be called to order on Dec. 8 at 1:30 p. m. C. L. S. Tingley, president of the association, will read his address and an address will be made by Prof. Emory R. Johnson of the Public Service Commission of Pennsylvania. This will be followed by the presentation of the report of Henry M. Stein, secretary and treasurer of the association. The session will then be concluded with the following program of papers and reports:

Presentation of problems referred to in the "Question Box," William A. Heindle of the Southern Pennsylvania Traction Company.

Paper, "The Latest Developments in Street Railway Equipment," by W. R. Steinmetz of the Westinghouse Electric & Manufacturing Company.

Report of the committee on preparing and filing rates and tariffs to be presented by C. B. Fairchild, Jr., chairman, statistician with the Philadelphia Rapid Transit Company.

The program for the session on Dec. 9, which will convene at 9:30 a. m., follows:

Paper, by H. S. Swift, treasurer of the West Penn Traction Company. Subject to be announced.

Discussion of "Question Box" problems.

Paper, "Efficiency Through Conservation of Time in Interurban Traffic," by E. C. Spring of the Lehigh Valley Transit Company.

Report of committee on uniform crossing agreement, of which R. P. Stevens is chairman..

Report of committee on height of car steps, of which H. H. Crowley is chairman.

Address by Dr. John Price Jackson, Commissioner of Labor and Industry.

Report of nominating committee and election of officers.

There will be a dinner at the Harrisburg Club on the evening of Dec. 8 for members and their guests.

### National Civic Federation

The annual meeting of the National Civic Federation will be held on Dec. 4-5 at the Hotel Astor, New York. On Friday, following the annual address of President Low, there will be fifteen-minute reports from the chairmen of the various departments, including August Belmont on provision for a model uniform workmen's compensation law, John Hays Hammond on the results of an inquiry throughout the country as to the business situation and its effects upon unemployment this winter, and William R. Willcox on the growth of employers' welfare work. On Friday afternoon Prof. J. W. Jenks will review present-day tendencies toward the substitution of governmental action for private enterprise. Ex-Governor Stubbs of Kansas, and Ex-Senator Jonathan Bourne of Oregon, will open the discussion on the question "Shall the Government Own and Operate the Railroads, Telegraph and Telephone Systems and Municipal Utilities?" Ex-Governor Stubbs will take the affirmative and Ex-Senator Bourne the negative side of the question as it relates to railroads, and Congressman David J. Lewis and Dr. Frederick C. Howe will present the affirmative sides respectively of the question as it relates to telegraph and telephone systems and municipal utilities. The negative side of the two latter subjects will be taken up by speakers yet to be named.

The session on Saturday morning, Dec. 5, will be devoted to the question of social insurance. George W. Perkins, chairman of the department, will preside. There will be a report of the commission sent to Europe by the Federation in the early summer to study sickness and unemployment insurance and old-age pensions. At the close of this session there will be a luncheon under the auspices of the workmen's compensation department at which will be discussed problems arising in connection with the operation of the workmen's compensation acts now in force in twenty-five states.

The afternoon session on Saturday will be devoted to the consideration of the questions of our preparedness for war and our duties under the Hague conference.

# Financial and Corporate

## ELECTRIC RAILWAY EARNINGS

### Figures of Representative Railways for September Show a Slight Decrease in Earnings on Account of War and General Business Conditions

The figures for gross and net earnings of electric railways in the United States for the month of September, 1914, in comparison with the same month of the previous year, as calculated by the ELECTRIC RAILWAY JOURNAL, show that the present business situation in this country brought about by the European war and by internal conditions has caused a slight aggregate decrease in earnings. This has not been widespread, however, as the accompanying table will show. This table, compiled from returns from fifty-three representative electric railways well divided geographically and also well differentiated as regards city, city and suburban, and interurban service, indicates that all sections and classes of lines secured increased gross and net earnings during the month in question, with the exception of the city lines in the East, the city and suburban lines in the South and the city lines in the Central section. Owing to the lack of monthly reports from Western companies it is impossible to report fully for these in September, but the returns from two companies in the Northwest testify to the fact that the business depression felt there for some time was still in progress.

Of the fifty-three companies examined, twenty-nine showed decreases in gross earnings for September, 1914, as compared to September, 1913, and twenty-seven companies suffered decreased net earnings. Of the twenty-three city lines covered by the table, thirteen showed decreases; of the sixteen city and suburban lines, eight showed decreases, and of the fifteen interurban lines, eight showed decreases—in most cases in both gross and net. Two companies, a city and an interurban line in the South, reported decreased gross revenues but increased net revenues. The total decrease in gross earnings for all the companies examined was 1.40 per cent, which was divided as follows over the four sections of the country: East, 0.93 per cent; South, 0.19 per cent; Central, 0.04 per cent; West, 7.7 per cent. If the figure for the West is eliminated on account of unequal returns the total decrease in gross earnings for the remaining sections is about 0.87 per cent. The aggregate net earnings decreased 2.24 per cent, which amount was made up by a 2.46 per cent decrease in the East, a 2.2 per cent increase in the South, a 0.64 per cent decrease in the Central section and a 13.1 per cent decrease in the West. Without the two Northwestern lines, the aggregate net earning decrease was 1.24 per cent.

The 0.93 per cent decrease for the Eastern companies was largely the result of a decrease of 1.4 per cent for large metropolitan lines. Of the seven city lines examined, only three showed increases. Increases were reported for city and suburban lines, however, amounting to 3.8 per cent, while the Eastern interurban lines had an aggregate increase in gross receipts of 1.9 per cent, only one line seeming to have been affected by conditions leading to metropolitan decreases. The total decrease in net earnings for the Eastern lines was 2.46 per cent, which was brought about in spite of a 9.4 per cent increase for city and suburban lines and a 5.7 per cent increase for interurban lines by a decrease of 4.1 per cent for metropolitan lines.

The best showing in the South was made by the city lines with a reported increase in gross earnings of 2.9 per cent and in net earnings of 8.2 per cent. Although interurban lines in Texas secured an increase of 0.5 per cent in gross earnings and 5.7 per cent in net earnings, there was an aggregate decrease of 0.19 per cent in gross earnings caused by a decrease of 2.5 per cent for city and suburban lines in Kentucky, Tennessee, Florida, Georgia and Virginia. Moreover, the 2.8 per cent decrease in net earnings on this class of lines in these states was sufficient to lower the aggregate net earning increase to only 2.23 per cent.

The most satisfactory record for September in the Central section was held by interurban lines as a class, which had an increase in gross earnings of 2.7 per cent and in net earnings of 2.9 per cent. A closer examination of this figure, however, shows that of the six interurban lines covered, five showed decreases in both gross and net earnings, but this condition was remedied in the aggregate by the large increase in gross and net earnings on a large system in Illinois. The gross earnings of city and suburban lines increased 0.5 per cent and the net earnings 0.6 per cent. Four of the six city lines reporting suffered decreases, giving a total decrease in gross earnings of 1.5 per cent and in net earnings of 3.3 per cent and reducing the aggregate showing for the Central section to a 0.04 per cent decrease in gross earnings and a 0.64 per cent decrease in net earnings. The city line decrease was lowered by a substantial increase in gross and net earnings for a large company in the milling district.

The above figures of course prove nothing conclusive in regard to the entire industry on account of the comparatively small number of reports. If monthly reports were obtainable from all electric railways it might be shown that a smaller percentage of the companies had suffered decreases in both gross and net earnings during September. On the other hand, the showing might be worse. Part of the industry has undoubtedly been affected by the present business decline, mostly through the closing down of industrial plants and the subsequent cutting off of traffic by employees. Yet in view of the facts that public utilities are more immune to business depression than are industrials or steam railroads, and that the slight losses now felt should be quickly recovered in the expected business revival, the outlook is by no means discouraging.

TABLE SHOWING PERCENTAGE OF INCREASES OR DECREASES IN GROSS AND NET EARNINGS OF FIFTY-THREE REPRESENTATIVE ELECTRIC RAILWAYS FOR SEPTEMBER, 1914 AND 1913

| | East | South | Central | West |
|---|---|---|---|---|
| City Lines: | | | | |
| Gross | 1.4 d | 2.9 | 1.5 d | ... |
| Net | 4.1 d | 8.2 | 3.3 d | ... |
| City and Suburban Lines: | | | | |
| Gross | 3.8 | 2.5 d | 0.5 | 7.7 d |
| Net | 9.4 | 2.8 d | 0.6 | 13.1 d |
| Interurban Lines: | | | | |
| Gross | 1.9 | 0.5 | 2.7 | ... |
| Net | 5.7 | 5.7 | 2.9 | ... |
| Aggregate: | | | | |
| Gross | 0.93 d | 0.19 d | 0.04 d | ... |
| Net | 2.46 d | 2.23 | 0.64 d | ... |

NOTE—The letter d denotes decrease.

## COLUMBUS AND GRAND RAPIDS COMBINATIONS

The consolidation of the Columbus Light, Heat & Power Company with the Columbus Railway, Power & Light Company is assured, as more than two-thirds of the outstanding stock of the two concerns has approved the plan, which was noted in the ELECTRIC RAILWAY JOURNAL of Nov. 14. Steps will be taken immediately to complete the merger of the properties. The stockholders of the Columbus Light, Heat & Power Company will receive what they originally demanded, one share of series "A" preferred for one share of their preferred, and one share of series "B" preferred for one share of their common. It is expected that the consolidation of the two companies will be completed before the close of the year. This action will bring all the lighting, power and heating properties in Columbus into one concern.

The Consumers' Power Company, which is controlled by the Commonwealth Power, Railway & Light Company through complete stock ownership, has applied to the Michigan Railroad Commission for authority to merge the following eleven companies, all of whose stocks and bonds are owned by it: Flint Electric Company, Pontiac Power Company, Saginaw Power Company, Bay City Power Company, Consumers' Power Company (Michigan), Economy Power Company, Au Sable Power Company, Central Power Company, Commonwealth Power Company, Grand Rapids-Muskegon Power Company and the Grand Rapids Edison Company. This merger, which is similar to the previous combination of the gas interests of the Commonwealth Power, Railway & Light Company, will result in making the Consumers' Power Company of Maine an operating instead of a holding company and will effect economies in administrative expenses and taxes, particularly the federal corporation tax. It is stated that the capitalization of the Consumers' Power Company of Maine will not be increased by the merger, the $13,930,000 of bonds of the companies being all deposited as collateral for the first lien and refunding 5 per cent bonds of the Maine company. Bonds of the latter company have been issued to a total of $12,936,000, (including $610,000 to be presently issued), $2,724,000 additional are held in escrow to take up additional bonds and a further amount is reserved for extensions.

D. E. Pomeroy, vice-president of the Bankers' Trust Company, New York, has been elected a director of the Commonwealth Power, Railway & Light Company, succeeding Benjamin Strong, Jr., resigned.

## ANNUAL REPORT

### Spokane & Inland Empire Railroad

The comparative statement of income, profit and loss of the Spokane & Inland Empire Railroad, Spokane, Wash., for the years ended June 30, 1913 and 1914, follows:

| | 1914 | 1913 |
|---|---|---|
| Operating revenues: | | |
| Freight | $310,930 | $336,813 |
| Passenger | 483,192 | 565,703 |
| Street railway system | 541,618 | 550,046 |
| Other revenue | 195,910 | 164,219 |
| Total | $1,531,650 | $1,616,781 |
| Operating expenses: | | |
| Way and structures | $257,284 | $226,161 |
| Equipment | 134,931 | 179,958 |
| Traffic | 21,759 | 24,935 |
| Conducting transportation | 497,006 | 512,139 |
| General and miscellaneous | 151,724 | 157,322 |
| Total | $1,062,704 | $1,100,515 |
| Net operating revenue | $468,946 | $516,266 |
| Taxes accrued | 150,000 | 147,000 |
| Operating income | $318,946 | $369,266 |
| Other income—miscellaneous | 3,840 | 4,936 |
| Gross income | $322,786 | $374,202 |
| Deductions: | | |
| Interest on funded debt | $238,513 | $241,542 |
| Interest on unfunded debt | 214,427 | 210,190 |
| Miscellaneous | 425 | 999 |
| Total | $453,365 | $452,731 |
| Deficit | $130,579 | $78,529 |

The operating revenues of the company decreased as follows during the year: Interurban freight, $25,883, or 7.7 per cent; interurban passenger, $82,551, or 14.6 per cent, and street railway system in Spokane, $8,428, or 1.5 per cent. The interurban passenger decrease is attributed partly to the withdrawal of the Alan race meet on the Coeur d'Alene division, but mostly to the general business depression. Other revenue, mainly from the sale of power, increased $31,691, or 16.1 per cent, giving a total decrease of 5.3 per cent. Operating expenses for way and structures increased $31,122, or 13.8 per cent, but other expenses showed the following decreases: Equipment, $45,027, or 25 per cent; traffic, $3,175, or 12.7 per cent; conducting transportation, $15,133, or 3 per cent, and general and miscellaneous, $5,598, or 3.6 per cent. The total decrease amounted to 3.4 per cent. The net operating revenue decreased $47,320, or 10.1 per cent. Taxes accrued increased $3,000, but the gross income decreased $51,416, or 13.9 per cent, and the deficit increased $52,049, or about 70 per cent. The operating ratio increased from 68.07 to 69.38, and the ratio of taxes to operating revenue increased from 9.09 to 9.79.

During the year the total expenditures for additions and betterments amounted to $152,487. The annual report calls attention to a heavy profit and loss charge of $558,255, in which connection it recalls that, effective July 1, 1914, the Interstate Commerce Commission ordered that all electric railways accrue depreciation on equipment but granted permission to carriers who had not set up reserves for accrued depreciation during the life of the equipment to charge to profit and loss that portion of the actual loss from depreciation equitably assigned to the period prior to July 1, 1914. A charge of $483,010 was made, therefore, to bring the depreciation up to date. In the future regular monthly charges to operating expenses will be made in accordance with the uniform system of accounting for electric railways prescribed by the commission.

Regarding general conditions in the Northwest, the report states that the lumber trade remains quiet, and the growing automobile competition is affecting the company's passenger business. The tributary country, however, is steadily developing and the crops are very satisfactry. With a continued decrease in the cost of operating the property and the promise of better conditions, the outlook is favorable.

The total interurban mileage of the company is divided as of June 30 into 176.684 miles for main line, 18.225 miles for second track and 42.472 miles for yard tracks and sidings. In a similar manner the mileage of the city traction lines in Spokane is made up of 35.535 miles for main line, 12.087 miles for second track and 5.569 miles for yard tracks and sidings.

## READJUSTMENT PLAN IN IDAHO

The Priest committee of holders of the first and refunding mortgage bonds of the Idaho-Oregon Light & Power Company, which is controlled by the Idaho Railway, Light & Power Company, Boise, Idaho, in a recent circular letter said that the foreclosure sale of the lighting property is set for Dec. 1 at Boise. While a considerable number of creditors' actions are still pending to have claims paid ahead of the mortgage, the status of these has been in part decided so that their relation to the plan can be dealt with. The committee's action in setting aside the validity of $718,000 of bonds has been decided in its favor, and an additional $107,000 of bonds, in a suit not yet decided, is conceded to be held by the railway only as collateral for possible claims up to $24,400. There are $2,494,000 of valid outstanding bonds entitled to participate in the proceeds of the sale, and of these more than 83 per cent are deposited with the committee.

The committee states that it is necessary to provide a substantial amount of cash to take up the receivers' certificates, to pay whatever claims may be allowed as preferred, to pay unassenting bondholders, cost of foreclosure and the like, and to make adequate provision for future development. It is planned to authorize several new security issues after the foreclosure sale. These include, first, $5,000,000 of first mortgage twenty-year gold bonds with interest at 6 per cent or such less rate as may be from time to time determined on successive issues, of which it is proposed to issue at once an estimated maximum of $800,000 to provide cash for the reorganization and for immediate needs. An additional $513,000 is reserved to retire divisional bonds at or before maturity; $637,000 is applicable to capital requirements under certain restrictions and the remaining $3,000,000 is afterward issuable for not more than 80 per cent of the cost of future additions. There will also be authorized $3,500,000 of general mortgage bonds at 3 per cent interest for the first five years and 6 per cent thereafter, of which an estimated amount of $2,100,000 is to be immediately issued to provide for all the bonds participating in the reorganization. The bonds will be held under a closed mortgage when the reorganization is complete. Cumulative 6 per cent preferred stock will have a total present estimated issue of $283,500 issuable to reimburse the holders of the present first and refunding mortgage bonds for $135 of interest unpaid. Non-cumulative 6 per cent preferred stock of a present estimated issue of $616,500 will be issued to provide $400 for each bond participating in the reorganization, and other issues will be made only for cash or property. There will be an authorized issue of $5,000,000 of common stock.

For each first and refunding mortgage bond participating in the reorganization, it is proposed to issue $1,000 of general mortgage bonds, about $135 of cumulative 6 per cent preferred stock, $400 of 6 per cent non-cumulative preferred stock and $800 of common stock, or a total of $2,335. The committee, however, reserves the right to modify the plan under certain restrictions.

The Krech committee of holders of the first and refunding mortgage bonds in a circular letter dated Nov. 16 objected to the above plan on account of the following reasons: (1) Doubt as to the accuracy of estimated net income; (2) insufficient provisions for immediate cash requirements; (3) continuance of destructive competition; (4) probable sale of property at auction at a price to give the bondholders the actual value of their bonds; (5) liens against bonds deposited with Priest committee aggregate more than 10 per cent of par value, and (6) failure of the committee to file a certificate of its cost, expenses, etc. It is stated that the estimate of the Priest committee is $2,060,000 for the value of the property, against which are underlying liens of $513,000 and proposed new issues of prior lien bonds, $800,000; general mortgage bonds, $2,100,000; preferred stock, $900,000 and common stock, $5,000,000. The Krech committee assumes that the property will not sell for more than $2,000,000. This committee states that the real cause of present conditions is too much power and too few customers, while the Priest committee asserts that the growth of business has been steady and substantial in spite of the general business depression in the Northwest, and desires to make adequate provision for future development.

**Alabama Traction, Light & Power Company, Ltd., New York, N. Y.**—Suits have been filed in the courts of Chilton and Shelby Counties, Ala., against the Alabama Power Company, the stock of which is owned by the Alabama Traction, Light & Power Company, for alleged damages aggregating more than $500,000 on account of the big lake created by the dam along the Coosa River.

**American Public Service Company, New York, N. Y.**—The gross earnings of the American Public Service Company for the twelve months ended July 31, 1914, were $397,672. The operating expenses and taxes totaled $260,224, leaving net earnings of $137,448. Bond interest paid and accrued amounted to $68,793, giving a balance for the period of $68,654. The above gross earnings and operating expenses and taxes compare with respective amounts of $369,285 and $248,341 for the twelve months ended Dec. 31, 1913. The American Public Service Company through its constituent companies operates various electric light and power, ice, water works and gas properties, mostly in Texas, as well as the Marshall (Tex.) Traction Company.

**Androscoggin Electric Company, Lewiston, Maine.**—The Androscoggin Electric Company, recently formed by the consolidation of the Lewiston & Auburn Electric Light Company and the Portland & Lewiston Interurban Railroad (organized as the Portland, Gray & Lewiston Railroad), as noted in the ELECTRIC RAILWAY JOURNAL of Oct. 31, has filed a mortgage to the United Safe Deposit & Trust Company, Portland, Maine, as trustee, to secure not to exceed $5,000,000 of first and refunding mortgage 5 per cent bonds, dated Oct. 26, 1914, and due on Oct. 1, 1934, without option of earlier redemption. The present issue is to be $1,800,000, of which $1,200,000 is reserved to retire at or before maturity the same amount of first mortgage 5's of the Lewiston & Auburn Electric Light Company, due on June 1, 1939, but callable at 105. The additional bonds are reserved for 80 per cent of the cost of future extensions. The officers of the new company are as follows: President, William T. Cobb, Rockland, Maine; secretary-treasurer, Julius Parkhurst, Lewiston, Maine; directors, William T. Cobb, Rockland, Maine; Maynard S. Bird and Hugh J. Chisholm, Portland, Maine; Harold Libbey and A. A. Libbey, Lewiston, Maine.

**Christchurch (New Zealand) Tramway.**—The revenue account of the municipally operated Christchurch Tramway for the year ended March 31, 1914, showed gross earnings from operation of £137,567 and operating expenses of £76,668. After deducting £25,683 for interest, £2,734 for sinking fund and £27,389 for reserve funds and allowing for £1,718 of rates from special areas there remained a net surplus of £6,810. The earnings increased £3,286, or less than 2½ per cent, but the operating expenses decreased £3,081. The operating ratio of 55 per cent is the record for Australasia. The saving came from keeping the service within stricter limits, the number of car-miles run being 2,162,769 (including 89,777 of extensions) as compared to 2,125,566 in the previous year. It is announced that the work of electrifying the North Beach line will soon be completed.

**Georgia Railway & Electric Company, Atlanta, Ga.**—The Georgia Railroad Commission has authorized the Georgia Railway & Electric Company to issue $160,000 of refunding and improvement mortgage forty-year 5 per cent sinking fund gold coupon bonds to cover expenditures made from Jan. 1 to June 30 for extensions and betterments.

**Interurban Railway & Terminal Company, Cincinnati, Ohio.**—At the recent annual meeting of the Interurban Railway & Terminal Company C. H. Worthington, C. J. Williams, Charles M. Leslie, M. Ackerman, A. F. Maisch and J. M. Hutton were chosen as members of the board of directors. The following officers were elected: C. H. Worthington, president; Charles M. Leslie, vice-president; C. J. Williams, secretary-treasurer, and Frank Dinsmore, general counsel.

**Lehigh Traction Company, Hazelton, Pa.**—The Lehigh Traction Company, which defaulted June 1 on the semi-annual interest on its first mortgage bonds, will again fail to make payment on Dec. 1, according to a letter to bondholders from N. C. Yost, treasurer of the company. Instead of paying the interest the company transmits an offer from Alvan Markle, president, to purchase the December interest coupons for his personal account if presented on or before Jan. 1. Mr. Markle made such a proposition in regard to the June coupons, which was accepted by virtually all the bondholders upon the recommendation of the protective committee. This protective committee is now advising bondholders that it will not recommend the acceptance of the purchase offer in the case of a second default. The company states that it has just resumed operations after an eight months' strike, and although the traffic is approaching its normal volume, the demands of operation require that all resources be utilized in that direction. The company under terms of the mortgage is allowed six months' grace before legal action can be taken on default.

**Melbourne Tramway & Omnibus Company, Ltd., Melbourne, Australia.**—The report of the Melbourne Tramway & Omnibus Company for the year ended June 30, 1914, shows tramway receipts of £766,426, an increase of £15,335, and omnibus receipts of £1,793, a decrease of £265, or total receipts of £768,219, an increase of £15,070. After paying maintenance expenses of £69,184, salaries of £29,177, wages of £264,904, interest of £74,250, dividends of £192,000, and other miscellaneous items, the company had left a balance of £152,006. From this the directors propose to pay a final bonus on the stock of £96,000, leaving £56,006 to be carried forward. The tramways carried 91,438,777 passengers during the year, and the omnibuses 430,008, a total of 91,868,785 and an increase of 2,016,022 over the previous year.

**Mexico Tramways, Mexico City, Mexico.**—For the calendar year 1913, the earnings of the Mexico Tramways from traffic amounted to approximately $3,266,734 in gold and miscellaneous earnings totaled $61,077, giving total earnings of $3,478,811. Operating and general expenses amounted to $1,190,175, maintenance expenses $370,806, taxes $56,016, giving gross profits from operation of $1,861,815. Rentals and fixed charges to subsidiary companies under leases, less amounts received as interest and dividends on securities held, amounted to $279,437, leaving a balance of $1,582,378 to be transferred to the profit and loss account at the head office in Toronto. After adding the balance from the previous year of $1,462,928, and deducting current expenses and fixed charges amounting to $1,473,419 and four quarterly dividends at the rate of 7 per cent, there was left a balance for the year of $1,382,967. The operating ratio for the year was 46.48 per cent compared to 47 per cent in 1912. At the end of 1913 the tramway system comprised 213.5 miles of single track, of which 204.087 miles were operated by electricity and 9.445 miles by mules. The total cash passengers carried during the year was 94,397,044.

**Northern Electric Company, Chico, Cal.**—A. Bonnheim, chairman of the protective committee of eight recently appointed by the convention of bankers to devise a feasible plan for the protection of the Northern Electric Railway and its creditors, denies that there is any intention of selling the company to the Atchison, Topeka & Santa Fé or any other concern. Stockholders believe that the road can be put on a sound financial basis in two years under proper management. The line has been earning $200,000 yearly above traffic expenses, but this sum did not cover the interest charges.

**Portsmouth Street Railroad & Light Company, Portsmouth, Ohio.**—All of the outstanding first mortgage ten-year 5 per cent bonds of the Portsmouth Street Railroad & Light Company have been called for payment at 102 and interest on Jan. 1 at the Bankers Trust Company, New York.

**Public Service Corporation, Newark, N. J.**—The Public Utilities Commission of New Jersey has authorized the Public Service Gas Company, a subsidiary of the Public Service Corporation, to increase its outstanding capital stock from $10,000,000 (all owned by the Public Service Corporation) to $10,750,000.

**Southern Pacific Company, San Francisco, Cal.**—The Southern Pacific Company has filed an application with the California Railroad Commission, asking authority to issue $1,170,000 of equipment trust certificates. The money is to be used for the purpose of purchasing the following equipment: twenty passenger locomotives, ten switching locomotives, fifty steel passenger coaches, twenty-two electric

motor coaches and two electric motor combination coaches and express cars. The equipment trust certificates will mature in ten equal instalments.

**West End Street Railway, Boston, Mass.**—At the annual meeting of the stockholders of the West End Street Railway on Nov. 24 it was voted to increase the capital stock by the issuance of 13,000 shares, par value $50. The proceeds are to be used to pay the Boston Elevated Railway for the cost of additions and improvements made to the property during the year. The retiring directors were re-elected.

## DIVIDENDS DECLARED

Citizens' Traction Company, Pittsburgh, Pa., $1.50.

El Paso Electric Company, El Paso, Tex., preferred (No. 25), 3 per cent; quarterly, 2¼ per cent, common.

Manhattan Bridge Three-Cent Line, Brooklyn, N. Y., quarterly 1½ per cent.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Rochester Railway & Light Company, quarterly, 1¼ per cent, preferred.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¾ per cent, common.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

## ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

| Period | | Gross Earnings | Operating Expenses | Net Earnings | Fixed Charges | Net Surplus |
|---|---|---|---|---|---|---|
| 1m., Oct., | '14 | $449,551 | ..... | ..... | ..... | ..... |
| 1 " " | '13 | 452,428 | ..... | ..... | ..... | ..... |
| 4 " " | '14 | 1,949,104 | ..... | ..... | ..... | ..... |
| 4 " " | '13 | 1,953,075 | ..... | ..... | ..... | ..... |

ATLANTIC SHORE ELECTRIC RAILWAY, SANFORD, MAINE

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Oct., | '14 | $27,184 | $26,025 | $1,160 | $623 | $537 |
| 1 " " | '13 | 25,420 | 25,003 | 417 | 654 | †237 |

BATON ROUGE ELECTRIC COMPANY, BATON ROUGE, LA.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $14,332 | *$9,385 | $4,948 | $2,087 | $2,861 |
| 1 " " | '13 | 14,254 | *9,847 | 4,407 | 2,127 | 2,280 |
| 12 " " | '14 | 177,279 | *115,159 | 62,120 | 25,182 | 36,938 |
| 12 " " | '13 | 156,427 | *96,083 | 60,343 | 23,647 | 36,696 |

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $13,080 | *$9,240 | $3,840 | $1,105 | $2,735 |
| 1 " " | '13 | 12,091 | *8,340 | 3,751 | 1,069 | 2,682 |
| 12 " " | '14 | 120,480 | *100,965 | 19,515 | 12,845 | 6,670 |
| 12 " " | '13 | 125,222 | *96,400 | 28,822 | 13,049 | 15,773 |

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $27,773 | *$17,817 | $9,956 | $6,397 | $3,559 |
| 1 " " | '13 | 32,516 | *16,956 | 15,560 | 6,082 | 9,478 |
| 12 " " | '14 | 367,115 | *210,435 | 156,681 | 76,218 | 80,463 |
| 12 " " | '13 | 373,223 | *203,762 | 169,461 | 71,449 | 98,013 |

COLUMBUS (GA.) ELECTRIC COMPANY

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $59,676 | *$25,716 | $33,961 | $28,812 | $5,169 |
| 1 " " | '13 | 50,685 | *22,186 | 28,499 | 24,601 | 3,898 |
| 12 " " | '14 | 664,645 | *280,648 | 383,996 | 313,304 | 70,693 |
| 12 " " | '13 | 638,691 | *293,129 | 345,562 | 255,029 | 90,533 |

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $216,514 | *$130,542 | $85,972 | $63,992 | $21,980 |
| 1 " " | '13 | 232,446 | *135,329 | 97,117 | 49,748 | 47,369 |
| 12 " " | '14 | 2,718,761 | *1,699,872 | 1,018,889 | 655,766 | 363,123 |
| 12 " " | '13 | 2,646,837 | *1,511,370 | 1,135,467 | 587,738 | 547,729 |

GRAND RAPIDS (MICH.) RAILWAY

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $108,327 | *$74,706 | $33,621 | $13,690 | $19,931 |
| 1 " " | '13 | 112,753 | *74,251 | 38,502 | 8,968 | 29,534 |
| 12 " " | '14 | 1,288,300 | *833,073 | 455,227 | 159,440 | 295,787 |
| 12 " " | '13 | 1,283,496 | *780,952 | 502,544 | 172,549 | 329,995 |

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $67,326 | *$40,914 | $26,412 | $15,550 | $10,862 |
| 1 " " | '13 | 64,139 | *38,647 | 25,492 | 15,630 | 9,862 |
| 12 " " | '14 | 673,618 | *462,414 | 211,204 | 184,676 | 26,528 |
| 12 " " | '13 | 668,841 | *414,878 | 253,963 | 177,643 | 76,320 |

PORTLAND (MAINE) RAILROAD

| | | | | | | |
|---|---|---|---|---|---|---|
| 1m., Sept., | '14 | $95,122 | *$53,522 | $41,600 | $19,555 | $22,045 |
| 1 " " | '13 | 90,286 | *55,687 | 34,599 | 16,503 | 18,096 |
| 12 " " | '14 | 1,038,223 | *641,664 | 396,559 | 256,549 | 140,010 |
| 12 " " | '13 | 1,030,896 | *708,200 | 322,696 | 144,736 | 177,960 |

*Includes taxes.
†Deficit.

# Traffic and Transportation

## DECISION IN CONNECTICUT FARES AND SERVICE CASE

### Commission Rates Safety Ahead of Good Service and Rules on Fares

The Connecticut Public Utilities Commission has issued its finding in the case of the petition of citizens of Meriden alleging inadequate service and unreasonable rates. The finding follows in part:

"On that part of the complaint relating to service, the commission is unable to find from the testimony any grounds for belief that conditions in Meriden are materially inferior to those on other divisions of the Connecticut Company system of equal importance. A certain amount of overcrowding undoubtedly exists here as at other places during the so-called rush hours and this is, to some extent, excusable on account of the nature of street railway traffic, the demands upon the company's equipment fluctuating. Safety is paramount in street railway operation, good service follows next in line of importance and every reasonable effort should be made to handle the passenger traffic expeditiously and comfortably at all times. Occasional failure to meet exceptional demands is not a justification for a general order requiring better or more frequent service.

"The Connecticut Company has not so failed except in a few instances on the Middletown line, and assurances were given that within a short time the company intended to revise the schedule on this line. As to the other matters of service, notably the lack of double-truck cars and flat wheels on some of the cars, the company had already remedied conditions by the installation of four additional serviceable cars, had improved conditions as to flat wheels whenever complaint had been made and was disposed to make further improvements now that specific attention had been called to certain cars. Under the foregoing conditions the commission does not feel warranted in issuing a formal order to the respondent on matters of service.

"On the question of rates between the towns of Meriden and Middletown, and Meriden and Wallingford, the commission is of the opinion that the petitioners have not justified their request for a reduction of the rates by a granting of transfers in the first case, and by reduction from 15 cents to 10 cents in the other case. In neither of these instances, taking into consideration the transfer privileges on the Wallingford line, does the average rate of fare appear to vary much from 1½ cents per mile, and the commission would not feel warranted, on the showing made, in declaring that rate excessive.

"If there are any special conditions which would take these cases out of the general rule, they were not presented for our consideration. This is true also on the question of whether the company should sell twenty-five tickets for $1. Most of the petitioner's witnesses testified, as they naturally would, that such a practice would be very desirable, but no facts were presented on which we would feel justified in ordering the company to take such a step. We do not consider that the sale of tickets at this rate in one city of the State, under the conditions presented at the hearing, constitute an unfair discrimination against Meriden or any reason for a further extension of the policy in the absence of a showing that the ordinary unit of 5 cents is an unreasonable charge for the service rendered in each case where such a unit is now the basis of the company's fare.

"We find, however, that the fare from Meriden Center to Archer's Corner is unreasonable. On the line via Cook Avenue, the charge is now 10 cents for a ride of 2.16 miles and via Hanover Street 10 cents for a ride of 2.83 miles, or at the rate of approximately 4.6 cents per mile in the first case and 3.5 cents per mile in the second case. So radical a variation within the city limits from the normal average rate per mile may well be considered as discriminatory against the district served and warrant some change in zone limits to secure a better equalization of rates. The present zones on the Meriden-Wallingford line are so constituted that passengers to Archer's Corner pay two fares for a trip of 2.16 miles by the shorter

route and 2.83 miles by another route. If the first zone limit were shifted to Archer's Corner or to the city line, a few hundred feet further, the company would still receive in excess of 1½ cents per mile for this distance. Without passing at this time on the question of whether or not a local rate of 1½ cents per mile is fair both to the company and public, as a general practice, it is the opinion of the commission that in this case, at least, an extension of the zone would result in a more equitable rate than the one now in effect.

"For the foregoing reasons, we hereby order and direct the Connecticut Company to alter its fare zone limits in the city of Meriden so that on and after Dec. 1, 1914, no fare in excess of 5 cents shall be charged or collected for a single ride between Archer's Corner and the railroad station in the center of the said city of Meriden by either of the present routes in either direction."

## "SAFETY FIRST" IN TOLEDO

The city of Toledo, Ohio, has a safety league organized by the Commerce Club with a score of prominent Toledo business men as members. This league has already engaged a woman teacher to start the work of giving "safety first" talks in every schoolroom in Toledo, in both public and parochial schools. The talks will be augmented by the moving picture "The Price of Thoughtlessness," which will be shown in every room. The Toledo Railways & Light Company has been able to secure a small moving-picture machine that does not require a booth and yet fulfils all requirements of "safety first." At the close of the talk the teacher who has been retained to carry on the work will distribute "safety first" buttons to all the children. Some 60,000 of these buttons have been contributed by the Toledo Commerce Club. They are all numbered and some of them have duplicate numbers, so that if one boy finds another boy with the same number on his badge each will get $1 on presentation of the button to the Commercial Club. This will stimulate the wearing of the button.

The Toledo Safety League plans also to reach all the parents by giving illustrated talks in the evening to all the parents' clubs in all the schools as well as before other clubs and lodges and societies. As a member from the Toledo Railways & Light Company on the safety league E. R. Kelsey is delivering these talks with the moving-picture films already referred to and some 100 traffic slides of various kinds. Further to stimulate interest in the safety work the league secured H. L. Brownell, supervisor of safety of the Chicago Surface Lines, to talk to all the public and the parochial school teachers and show them the films and slides used by that company. The league has also arranged to have Marcus A. Dow, supervisor of safety for the New York Central Lines, present at a general safety meeting.

On Nov. 22 the Newsboys' Association had a safety meeting at which more than 1000 boys were in attendance. Commodore Gunckel, father of the newsboy movement, said it was the finest meeting the newsboys had ever had. Buttons were distributed and a safety film shown.

The safety committees within the company itself are so thoroughly organized in the different carhouses that several times the chairman of the committee at one of the carhouses has reported to the manager of railways that his carhouse had gone twelve or thirteen days without an accident. Although the work has just got a good start a marked decrease in the number of accidents has already been shown.

## COPPER INSTEAD OF NICKEL FARE ZONES

The Public Service Commission of Indiana on Nov. 21 granted the petition of the Union Traction Company of Indiana, filed several months ago by Arthur W. Brady, president, to establish on its lines a 1-cent or "copper" zone instead of the present 5-cent or "nickel" zone as a basis for its passenger tariffs. The company is authorized to file with the commission a new schedule of passenger tariffs, which will put into effect on its lines in Indiana rates practically approximating 2 cents a mile for the distances actually traveled; provide a minimum fare of 5 cents; give due consideration to competitive fares, lowering its fares to correspond in such circumstances; sell commutation tickets in books of twenty round trips at the rate of 1¼ cents a mile, and discontinue the sale of round-trip tickets at amounts less than two full fares. It is believed by the Union Traction Company officials that many inequalities in the fares now existing will be eliminated by the new "copper zone" system. The order of the commission provides that fares shall be computed as follows:

"At the rate of 2 cents a mile for the distance actually traveled, as nearly as practicable, a half mile at 1 cent each to be taken as the unit. In the case of fractional miles from 0.75 (regarded as 0.8) of any mile to 0.24 (regarded as 0.2) of the next mile, both exclusive; fractions shall be disregarded, and the intervening whole mile regarded as the distance. In the case of fractional miles from 0.25 (regarded as 0.3) of any mile to 0.74 (regarded as 0.7) of the same mile, both inclusive, the fractional distance shall be regarded as ½ mile, and the total distance shall be taken as the number of whole miles and one-half. For instance, any distance from 5.3 miles to 5.7 miles, both inclusive, shall be regarded as 5.50 miles, and any distance from 5.8 miles to 6.2 miles, both inclusive, shall be regarded as 6 miles. The minimum fare shall be 5 cents, and due consideration shall be given to competitive mileage of steam or other electric railroads. The fares for children between five and twelve years of age shall be at the rate of 1 cent a mile, computed in the method above outlined."

## LOUISVILLE "TROLLEY TOPICS"

*Trolley Topics*, the publication for distribution among employees of the Louisville (Ky.) Railway, has made its appearance. It is a small bulletin of eight pages and is devoted to the interests of the company's employees. In the foreword the purpose of the publication is set out as follows:

"With this issue *Trolley Topics* makes its first appearance and extends greetings to each employee in all departments.

"It is essentially a paper of and for the employees of the Louisville Railway and the Louisville & Interurban Railroad, and has been conceived in the interest of those having at heart the welfare, prosperity and advancement of our company and our fellow employees, and in the effort to attain for our patrons the best and safest street car service in the country.

"Through the medium of *Trolley Topics* it is hoped to promote efficiency, to bring all departments into closer harmony, to suggest improvements and betterments to the service, to engender co-operation, to become better acquainted, to please all and offend none."

One of the departments in future will be a questions and answers section.

## COURT DECISION IN REROUTING CASE

The Supreme Court of Nebraska has overruled the motion of the Lincoln Traction Company for a rehearing in the Herpolsheimer case. This action of the court makes effective the decision of the District Court which prevents the company from further abandoning any lines of the old Citizens Street Railway without permission of the Railroad Commission. The District Court decision, now effective, requires the company to put the College View high line cars back on Twelfth Street and to run the high line cars every twenty minutes. These cars now run every thirty minutes. The court says:

"We have not decided in this particular case that the defendant company cannot establish new lines of service upon such streets as the city may permit, nor that it cannot initiate necessary changes in the management of its business. It is not essential that every minor change in the conduct of the traffic, or in the service rendered, or in other matters of detail concerned with the operation of the line should be preceded by an application to the Railroad Commission for permission to make the change. The opinion does not so hold. The point decided is that the company cannot make such changes in the routing of its cars as the evidence in this case shows were made or contemplated, without first obtaining the approval of the commission."

The company has since applied to the State Railway Commission for a temporary order permitting the continuation of the present routing until a hearing can be had by the commission. The application sets forth that the company will require ninety days to secure special tracks required by the change; that an additional operating expense of $6,500 will be entailed, and that it has in hand petitions

from patrons affected favoring the present service. It requests permission to control the routing of its cars. Two of the commissioners were out of town when the application was filed, and the request for a temporary order cannot be considered until all three are present.

## AUTO BUS COMPETITION IN LOS ANGELES

There has recently been an enormous increase in the number of privately-owned automobiles that solicit "fares" at 5 cents each on the streets of Los Angeles. The automobiles are operated chiefly during the rush hours and have so considerably affected the earnings of the street railways that there has been much discussion on the question of passing some ordinance to regulate their operation. The first definite step in this direction was taken on Oct. 11 when the Board of Public Utilities of Los Angeles submitted a statement to the City Council calling attention to the fact that, obviously, the motor bus business should be regulated in some manner. The city's legal department has stated unofficially that the city can regulate the motor buses by requiring them to run on regularly stated routes and on a definite time schedule, but the city's right to require the filing of indemnity bonds, it was stated, would have to be established. Early in November the city had issued a total of 842 permits to chauffeurs for operating cars in passenger service. Of this total about 650 were operating on regular runs and taking 5-cent fares. A great many privately-owned automobiles are, however, being used by the public during the rush hours and at other times, for which no licenses have been issued, and the number of these is increasing daily. Some automobiles even make regular runs to near-by suburban points and charge 5 cents for the ride that costs 10 cents on the electric line.

The public utilities committee of the city of Los Angeles announced that it would hold a public hearing on Nov. 27 at which the question of regulating the auto bus business of that city would be discussed.

**Fare Increase Under Advisement.**—The South Carolina Railroad Commission has taken under advisement the application of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., to increase its rates on its line in that State from 1 cent to 2 cents a mile.

**Steam Passengers Transferred to Electric Line.**—The Quincy, Omaha & Kansas City Railroad (steam) has put into execution its plan of transferring its Kansas City passengers and their baggage to the Kansas City, Clay County & St. Joseph Railway (electric) at Avondale in Clay County. This action is taken to avoid the expense of bringing passengers into the new Union Station in Kansas City.

**Increase in Fare Asked in Kansas.**—Alleging that the cost of operation has increased to such an extent since the 2-cent fare went into effect that railroads cannot maintain first-class passenger service at a profit, all the railroads doing business in Kansas have filed with the Public Utilities Commission applications for the restoration of 3-cent fares. A hearing probably will not be had until the new commission assumes office after Jan. 1, 1915.

**Chicago Surface Lines Aid Red Cross.**—Acting on the permission granted by Mayor Harrison and the Chicago City Council, the Chicago Surface Lines gave to the Red Cross for use in the European War Relief work a check for $2,000. Since the city was entitled to a part of the income from the lines it was necessary to get its sanction. Leonard A. Busby, president of the company, states that the contribution was made and charged to the Chicago Surface Lines individually and was made upon the unanimous request and approval of the executive committee.

**"Tricky" Patrons.**—A letter was addressed to the editor of the Topeka *Capital* recently in which the writer expressed the opinion that it would be interesting to know how many people are "victimized" a week by the Topeka Railway paying out in change Canadian dimes in place of American dimes. To the letter as published in the *Capital* the editor appended this note in the usual parentheses: "Patrons should examine their 'change.' We do not imagine the street railway company imports Canadian money. If it pays such coins out they are coins that tricky patrons have already passed to the company."

**New Interurban Fares.**—The New York State Railways, Syracuse, N. Y., has filed with the Public Service Commission of the Second District of New York, effective on Dec. 15, 1914, new joint one-way fares from Canastota, Chittenango, Clark Mills, Hecla, Kirkville, Manlius Center, Syracuse, Utica, Vernon and Wampsville to destinations on the New York, Ontario & Western Railroad. All fares are advanced 2 cents to Durhamville and Kenwood, 3 cents to State Bridge and Valley Mills, 4 cents to Stockbridge, 5 cents to Fish Creek and Munns, 6 cents to North Bay, 7 cents to Pratts and White's Corners, 8 cents to Jewell and Morrisville, 9 cents to Eaton, 10 cents to Cleveland, 11 cents to Randallsville, 13 cents to Earlville, 15 cents to Smyrna, 17 cents to Sherburne Four Corners, 18 cents to Galena, and 21 cents to Norwich.

**Increase in Freight Rates.**—The Indianapolis, Columbus & Southern Traction Company, which operates between Louisville and Indianapolis over the connecting Insull lines, is preparing to put into effect the 5 per cent increase in freight rates which have been allowed by the Interstate Commerce Commission. On May 28 the commission, acting at the instance of Louisville shippers, instructed the railway to establish through and joint freight rates between Louisville and points in Indiana, including Indianapolis. The present order is a sequel and will apply to merchandise in less than carload lots, taking the first, second, third and fourth-class rates. Existing class rates are 18 cents, 16 cents, 14.5 cents and 11 cents a hundred to Indianapolis, and under the order the rates will be 18.9 cents, 16.8 cents, 15.2 cents and 11.5 cents, while rates to intermediate points will be advanced proportionately.

**Hocking Valley Railroad Case.**—Arguments of counsel for the Hocking Valley Railroad and the Public Utilities Commission of Ohio were heard by the Supreme Court on Nov. 18 in the appeal from an order of the commission requiring the company to maintain electric railway service between Wellston and Hamden. The company claims that the line is no longer profitable and that an outlay of $25,000 will be required to put the road in shape to continue service. The commission contended that because a unit of a system is not profitable that fact does not furnish a reason for the abandonment of the unit so long as the whole system is profitable. It further stated that the company cannot at will withdraw a service which it had educated the people to use and depend upon in their daily activities and business. The company offered to maintain steam train service in place of the electric service, but the commission refused to accept this change.

**I. T. S. Prizes Awarded.**—The Illinois Traction System, Peoria, Ill., has announced the winners in the annual contest among the various substations for the best kept station. The substations are divided into two classes, those with agencies and those without agencies. First prize for the best kept substation with an agency was awarded to Union, a station about 15 miles north of Lincoln. Second prize was awarded to Fithian, which is between Champaign and Danville. The first prize for the best kept substation without an agency was awarded to Verden, which is located south of Springfield. Second prize was awarded to Anderson, which is north of Carlinville. System card passes for the agents and substation attendants constituted the first prize in both instances. Division card passes for the agents and the substation attendants were awarded as the second prize in both cases. About forty substations on the line participated in the contest.

**Heavy Municipal Railway Traffic.**—On Oct. 8 there was an aviation exhibition at the exposition grounds in San Francisco and the attendance was about 40,000. The municipal railway has two lines running direct to the grounds. Only seventy-nine cars were in commission on the municipal system to maintain service on all five lines, but the crowds were handled satisfactorily and without delay. The receipts on the several lines on Oct. 8 were as follows: "A" line (Geary Street, Market Street and Tenth Avenue) $1,004; "B" line (Ferries to Ocean, via Market and Geary Streets) $1,223; "D" line (Ferries to exposition grounds, via Van Ness Avenue) $914; "E" line (Union Street line, Ferries to Presidio) $1,242; "H" line (Potrero Avenue and Van Ness Avenue) $481. By the time the exposition opens the municipal railway will have 197 cars in service and

will have added to the system the California Street and the Stockton Street and Columbus Avenue lines.

**Ruling Regarding Free Transportation.**—The Railroad Commission of Pennsylvania having been requested to express its opinion upon the question whether a railroad, street railway or other transportation company may lawfully grant free passes to charitable organizations, has ruled as follows: "As we have heretofore had occasion to point out, in connection with similar questions relative to the subject of free transportation, the constitution of the commonwealth, in Article XVII, Section 8, expressly provides, that: 'No railroad, railway or other transportation company, shall grant free passes, or passes at a discount, to any person except officers or employees of the company.' So long as this prohibition remains as it now stands in the constitution, the commission is powerless to hold that free transportation may be issued to a charitable organization for charitable purposes, however much we might otherwise be in accord with a public policy which would permit of such free transportation in this class of cases."

**Passengers to Determine Rerouting.**—The rerouting due to the opening of the new union station at Kansas City, Mo., has met with sufficient objection in only one instance to cause any possibility of a change to arise. This case is that of the Independence line, which was rerouted to enter the business district three blocks south of its former course. The board of control is planning a unique system of disclosing the facts as to the logical routing. Cards will be printed with blanks on which passengers from Independence and vicinity will indicate their destination in Kansas City. These cards will be handled by Metropolitan Street Railway or board of control employees, who will ascertain the facts from the passengers, the inspectors noting also the point at which the persons board the cars. The suggestion that the passengers on the Independence cars vote as to their preferences in routing was rejected because business interests or associations might influence the vote and the result would not indicate the logical route for the traffic.

**Pacific Electric Railway Offers Prize.**—The Pacific Electric Railway, Los Angeles, Cal., has announced a contest for the selection of a name and symbol for the new personally conducted trolley trip which it proposes to launch Jan. 3, 1915. The trip will be different from anything the company has ever operated, taking the tourist through the fruit districts of Pomona, Upland, Alta Loma, Etiwanda, Fontana, Rialto, San Bernardino, Riverside and Redlands. The company will pay $50 in cash to the first person sending in a name and symbol selected by the judges as the most appropriate for this trip. A prize of $25 will be awarded for the second best selection of name and symbol. Like the Old Mission, Triangle and Balloon route trolley trips, the new trip will afford to the tourist access to many points of interest through the southern part of the State, but still is different from them in many respects. The trip will start from the Pacific Electric station, Los Angeles, at 9 a. m. The return from Redlands will be made at 4:30 p. m., arrival at Los Angeles being scheduled for 7:30 p. m.

**Safety Movement on Evansville Railways.**—The first six months of operation of the "safety first" movement on the Evansille (Ind.) Railways has just been completed. In celebration of this occasion the outgoing members of committees banqueted the incoming members. Two local safety committees, one for each division of this company's lines, are appointed every six months. Regular meetings are held each month, when action is taken on all suggestions sent in by employees. These suggestions are then forwarded to the general safety board, comprised of department heads and the chairmen of the local committees, who finally approve or reject them. The membership of each committee is such that it will furnish an avenue through which any employee can make suggestions. Each employee is requested to make these suggestions to the committee member with whom he is most closely in touch, and he need not confine the suggestions to matters pertaining only to his department. In connection with the suggestions offered and their value, it is interesting to note that during the first six months' period eighty-seven suggestions were offered. From this number the local committees and the general board approved seventy-four.

# Personal Mention

**Mr. V. M. Combes** has resigned as claim agent of the Kansas City-Western Railway, Leavenworth, Kan.

**Mr. Louis P. Howe** has been elected president of the Keene (N. H.) Electric Railway, to succeed Mr. Charles Warren.

**Mr. Gideon Adams** has been appointed roadmaster on the Atlantic & Suburban Railway, Pleasantville, N. J., to succeed Mr. George Dixon.

**Mr. E. Lewis** has been appointed roadmaster on the Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., to succeed Mr. J. Raney.

**Mr. A. Carroll** has been appointed roadmaster of the Southwestern Traction & Power Company, New Iberia, La., to succeed Mr. A. Heflin.

**Mr. H. Aldrich** has been appointed superintendent on the Claremont Railway & Light Company, Claremont, N. H., to succeed Mr. T. A. Clark.

**Mr. Glenn M. Averill** has been elected president of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa, to succeed Mr. J. F. Porter.

**Mr. A. M. Baldwin** has been elected treasurer of the Central California Traction Company, San Francisco, Cal., to succeed Mr. Walter Arnstein.

**Mr. A. L. McAllister** has been appointed auditor of the Southern Illinois Railway & Power Company, Harrisburg, Ill., to succeed Mr. C. R. Scott.

**Mr. W. O. Demoss** has been appointed master mechanic of the Wilmington & Philadelphia Traction Company, Wilmington, Del., to succeed Mr. J. W. Gerke.

**Mr. A. S. Henry** has been appointed superintendent of the Lockport division of the International Railway, Buffalo, N. Y., to succeed Mr. J. W. Andrews.

**Mr. H. U. Wallace,** vice-president and general maanger Western Light & Power Company, Boulder, Col., is now in charge of purchases, succeeding Mr. J. W. Ryall.

**Mr. P. L. Saltonstall** has been elected treasurer of the Manchester Traction, Light & Power Company, Manchester, N. H., to succeed the late S. Reed Anthony.

**Mr. Shelton E. Martin** has been elected secretary of the Third Avenue Railway, New York, N. Y., and affiliated companies, to succeed Mr. Frederick J. Fuller.

**Mr. H. J. Parks,** master mechanic of the Alton, Granite & St. Louis Traction Company at East St. Louis, Ill., has had his jurisdiction extended to cover the Alton City lines.

**Mr. Charles Witzel,** purchasing agent of the Third Avenue Railroad, New York, N. Y., has succeeded Mr. H. I. Sutherland as purchasing agent on the Yonkers (N. Y.) Railroad.

**Mr. Frank Martin** has been appointed chief engineer of the power station of the Trenton & Mercer County Traction Corporation, Trenton, N. J., to succeed Mr. De Witt Smith.

**Mr. M. Heffner** has been appointed superintendent, purchasing agent and master mechanic of the Allentown & Reading Traction Company, Allentown, Pa., to succeed Mr. W. J. Bear.

**Mr. P. E. Seddon** has been appointed secretary, treasurer and purchasing agent of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., to succeed Mr. S. H. Waddell.

**Mr. C. M. Leslie,** formerly claim agent of the Interurban Railway & Terminal Company, Cincinnati, Ohio, has been elected vice-president of the company to succeed Mr. Warren Bicknell.

**Mr. T. D. Dugan,** formerly chief dispatcher of the Dayton, Covington & Piqua Traction Company, West Milton, Ohio, has been appointed assistant superintendent, to succeed Mr. A. C. Kelley, resigned.

**Mr. Matthew C. Brush,** vice-president of the Boston (Mass.) Elevated Railway, has been nominated a member of the executive committee of the Alumni Association of the Massachusetts Institute of Technology.

**Mr. C. J. Williams,** formerly assistant secretary and auditor of the Interurban Railway & Terminal Company, Cin-

cinnati, Ohio, has been elected secretary-treasurer of the company to succeed Mr. James M. Hutton.

**Mr. Mortimer G. Gould** has been elected president of the Lima-Honeoye Light & Railroad Company, Lima, N. Y., to succeed Mr. D. M. Lewis, who continues with the company as secretary, general manager and purchasing agent. Mr. Gould also acts as chief engineer of the company.

**Mr. Michael Connor,** who has been superintendent over all of the line of the Illinois Traction System between Danville and Decatur, has been made superintendent from Danville to Urbana, with headquarters in Danville. Mr. Bert Snyder will be superintendent from Champaign to Decatur with headquarters in the latter city.

**Mr. Delos F. Wilcox,** for six years head of the franchise bureau of the Public Service Commission of the First District of New York, has been appointed first deputy commissioner of water supply, gas and electricity of New York to succeed Mr. F. T. Parsons, resigned. Since last summer Mr. Wilcox has been working on an appraisal of the private water supply plants in Queens which the city expects to buy or condemn.

**Mr. Charles W. Mullen,** Bangor, has been nominated as the third member of the new Public Utilities Commission of Maine by Gov. William T. Haines, the nomination of ex-Congressman S. W. Gould, Skowhegan, having failed of confirmation by the Governor's Council. Mr. Mullen and Mr. Gould are both Democrats. Mr. Mullen was graduated from the University of Maine in 1882 and was largely responsible for developing the important water power at Millinocket and took the lead in the development of the Great Northern Paper Company. He has also been identified with other large business projects in Maine. He was twice Mayor of Bangor, and has served one term in the Maine House and one in the Senate. He has twice been a Democratic candidate for Congress.

**Mr. W. S. Henning,** who has been appointed general manager of the Southwestern Traction & Power Company, New Iberia, La., began his railway career in 1898 as resident engineer in charge of track, railway, bridges and buildings on the Houston & Texas Central Railroad at Ennis, Tex. He continued in this capacity until 1902. He then accepted a position as construction engineer on the Southern Pacific Company's branch lines in Matagorda County, Tex. From 1903 to 1906 he was engineer of maintenance of way of the Galveston (Tex.) City Railway, covering the period during which the grade of the city was raised. From 1906 to 1912 he was engaged in construction work for the Southern Pacific Company in Louisiana. In 1912 he was appointed chief engineer of the Southwestern Traction & Power Company.

**Mr. W. H. Davidson** has been appointed auditor for the receivers of the Columbus, Delaware & Marion Railway, Columbus, Ohio, to succeed Mr. A. F. Elkins, who, as previously noted in the Electric Railway Journal, resigned some time ago to accept an appointment as accountant in the division of valuation in the Interstate Commerce Commission, with headquarters in Chicago. Mr. Davidson is thirty-three years of age. Before accepting the appointment to the Columbus, Delaware & Marion Railway he was connected with steam railroads. He resigned from the United States weather bureau service in March, 1906, to accept a position in the accounting department of the Gulf, Colorado & Santa Fé Railway at Galveston, Tex. In September, 1907, he resigned from that company to become connected with the office of the auditor of the Hocking Valley Railway at Columbus, Ohio, and continued with that company in the auditing department until he was appointed to succeed Mr. Elkins with the Columbus, Delaware & Marion Railway.

**Mr. Oscar T. Crosby,** who resigned as president of the Wilmington & Philadelphia Traction Company, Wilmington, Del., two years ago, has just returned to this country from a trip abroad, during which he traveled in Spain, Algeria, Tunisia, Egypt, Turkey, India, Borneo, Ceylon, the Federated Malay States, Java, Borneo and Japan. Mr. Crosby returned to the United States through China and Russia by the Trans-Siberian Railway. He was in Pekin when war was declared, but did not find it difficult to pass through Russia, Finland, Denmark, Germany and Holland. His trip in Turkey and Borneo was off the usual lines. In Turkey he drove about 600 miles, following the Euphrates River from Aleppo to Bagdad and Babylon, and then crossed the Persian Gulf to India. In Borneo he took a trip through unexplored country, visiting Dyaks who had never before seen a white man. He was able to do this through the courtesy of the Dutch officials, who loaned him a small steamer by which he ascended one of the unfrequented rivers, and later used small boats rowed by native Malays.

**Mr. Harry B. Weatherwax** has been elected vice-president of the various electric railways controlled by the Delaware & Hudson Company. The properties with which Mr. Weatherwax will be connected in addition to his present duties with the Delaware & Hudson Company are the United Traction Company, Albany, N. Y., Hudson Valley Railway, Troy & New England Railway and Plattsburg Traction Company. There will be no change in the organization of the various companies. Messrs. Reynolds, Hewitt and Barber retain all their authority. Mr. Weatherwax will represent Mr. C. S. Sims, vice-president of the Delaware & Hudson Company, in connection with all electric railway matters, thereby relieving Mr. Sims of many details which he has handled in the past. Mr. Weatherwax was formerly chief clerk to Mr. W. J. Mullin, general traffic manager of the Delaware & Hudson Company, and later was appointed industrial agent of the company. Last year he was elected vice-president of five subsidiary corporations of the Delaware & Hudson Company.

**Mr. Ray W. Reynolds** has resigned as manager of the Springfield (Mass.) Street Railway, to become general manager of the Mesaba (Minn.) Railway. Mr. Reynolds took the position of manager in Springfield when he succeeded the late George F. Reed, who died suddenly on Jan. 10, 1914. At the time of his appointment he was secretary and general manager of the Hartford & Springfield Street Railway, with headquarters at Warehouse Point, Conn., having been appointed to that position on Aug. 1, 1912. Mr. Reynolds was born in Mattoon, Ill., in 1882 and was graduated from the Armour Institute of Chicago in 1900. He then spent two years in the electrical engineering department of Purdue University at Lafayette, Ind. His first work in the electric traction field was with the old Indianapolis & Northern Railway, which is now a part of the system of the Terre Haute, Indianapolis & Eastern Traction Company. He worked through all of the departments and was appointed superintendent in 1905. In 1907 he became connected with the Chicago, South Bend & Northern Indiana Railway at South Bend. At one time he was also in charge of the Southern Michigan Railway. In 1910 Mr. Reynolds was elected vice-president of the American Light & Water Company, Chicago, and placed in charge of the construction work. He supervised the building of electric lighting stations and hydroelectric developments which this work called for until August, 1912. From this position he came East to accept the place made vacant by the resignation of Mr. H. S. Newton, then manager of the Hartford & Springfield Railway.

**Mr. L. A. Magraw,** who, as noted in the Electric Railway Journal of Nov. 14, was appointed general manager of the Macon Railway & Light Company, Macon, Ga., was born in Springfield, Mass., on May 7, 1883. He attended the public schools at Waterbury, Conn., and was graduated from the Worcester Polytechnic Institute in 1905. He then entered the test department of the Crocker-Wheeler Company, with which he remained two years. During part of this time Mr. Magraw was instructor at Sibley College, Cornell University. In 1907 he entered the employ of the Westinghouse Electric & Manufacturing Company as erecting engineer at Philadelphia, and during his connection with the company at that place he supervised the installation of many steam turbine plants throughout Pennsylvania. In 1909 Mr. Magraw was transferred to the engineering department of the Westinghouse Electric & Manufacturing Company, and as resident engineer at Charlotte, N. C., he was active in the development of high-tension apparatus and supervised the installation of one of the first outdoor substations carrying 110,000 volts. In 1911 Mr. Magraw was appointed chief engineer of the Central Georgia Power Company and in January, 1912, he became chief engineer of the Central Georgia Transmission Company and had charge of the construction of a number of substations, distributing and high-tension lines in north-central Georgia. In March, 1912, he was ap-

pointed chief engineer of the Macon Railway & Light Company and began the reconstruction of the distribution lines, feeders and overhead trolley in the city of Macon and also supervised the construction of a number of cars. In January, 1913, he was appointed general manager of the Central Georgia Power Company and Central Georgia Transmission Company, and in October, 1914, he was appointed general manager of the Macon Railway & Light Company.

**Mr. Herbert M. Flanders,** engineer of maintenance of way of the Springfield (Mass.) Street Railway and other lines controlled by the New England Investment & Security Company, has been appointed general manager of the Springfield system, to succeed Mr. Ray W. Reynolds, who has resigned to accept the position of general manager of the Mesaba (Minn.) Railway. Mr. Flanders will become manager on Dec. 1, when the resignation of Mr. Reynolds becomes effective. Ever since his graduation from the Massachusetts Institute of Technology in 1900 Mr. Flanders has been constantly in railroad work. He was born in Haverhill, Mass., in 1876, and received his education in that city and in Malden, Mass. After his course at the Massachusetts Institute of Technology Mr. Flanders was employed by the Boston & Maine Railroad, but soon left this position to engage in the construction of the electric railway in Portsmouth, N. H. When the road was finished, two years later, he remained to take charge of the work of eliminating grade crossings. Later he took up the work of surveying new routes for electric railways and assisted in laying out the Boston & Haverhill and the Boston & Worcester electric lines. He was appointed engineer of maintenance of way for the Houston (Tex.) Electric Railway in 1906 and a year later he went to Fort Worth, Tex., as chief engineer of the Northern Texas Electric Railway. After eighteen months with this company he returned to Massachusetts as roadmaster of the Newton Street Railway. He went to Springfield in 1909 as roadmaster for the Springfield and Berkshire systems when the latter system was under the direction of the New England Investment & Security Company. On Dec. 1, 1913, he was appointed engineer of maintenance of way of the Springfield Street Railway and on Nov. 21 he was selected as manager of the system.

H. M. Flanders

## OBITUARY

**Douglas S. Martin,** who relinquished his position on the editorial staff of the *Electrical World* in August to enroll in the forces of Great Britain, has succumbed to shrapnel wounds received at the battle of Messines on the Belgium border. Mr. Martin was graduated as an electrical engineer from the Central Technical College, London, England, and was formerly editor of the *General Electric Review*. After resigning from that paper he engaged in electrical work in the Far West and on returning East joined the editorial staff of the *Electrical World*. Mr. Martin was twenty-seven years of age. He was a brother of Mr. T. C. Martin, secretary of the National Electric Light Association.

**John Murphy,** formerly general superintendent of the Pittsburgh (Pa.) Railways, died on Nov. 24 at Orlando, Fla., after a long illness. Mr. Murphy settled in Pittsburgh about thirty years ago. He entered electric railway work under the late William J. Burns with the Second Avenue Traction Company, Pittsburgh. Later he became superintendent of that company. When the West End Traction Company was merged with the Second Avenue company he was placed in charge of both systems and when the Pittsburgh, Allegheny, Manchester and Pleasant Valley lines were absorbed he was appointed general superintendent of all of them. He was subsequently appointed general superintendent of the Pittsburgh Railways and retained that position until Feb. 1, 1909, when he retired on account of ill health. Mr. Murphy is survived by a widow, three sons and three daughters.

# Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

## FRANCHISES

**Tucson, Ariz.**—The Tucson Rapid Transit Company has received a twenty-five-year franchise from the Council in Tucson.

***Searcy, Ark.**—The Searcy & Kensett Transportation Company, represented by H. E. Hill, has received a franchise from the Council to build an electric railway in Searcy and extend it to Kensett, 4 miles. Application for a charter will soon be made by this company.

***Jacksonville, Fla.**—The Port Commissioners with a formal request received the approval of the County Commissioners recently to cross all highways, streets and byways in Duval County with the proposed railway line from the new dock site to the connecting lines of the railways in Jacksonville.

**Boston, Mass.**—The subway extension to Everett and to Malden is supposed to be completed next February, but the work has not been begun. An extension of time is asked for by the Boston Elevated Railway on the ground that there has been unforeseen delay in the dredging of Mystic River.

***St. Louis, Mo.**—The introduction of an ordinance to permit the city of St. Louis to construct the loop at the western approach in conjunction with the work of completing the free bridge is being seriously considered by city officials. With the repeal of the Southern Traction franchise for such a loop there is no immediate prospect of one being constructed otherwise. Andrew Scully, a member of the House of Delegates, said recently he is contemplating introducing such an ordinance. He said he had consulted railroad experts and they advised him that the cost would be about $30,000 a mile. The loop, he said, would include about 3 miles of track, and he estimated it could be built with an appropriation of about $100,000.

**Newark, N. J.**—The Public Service Railway has received nine franchises from the Board of Public Works to be utilized in connection with the proposed terminal in Newark.

**La Salle, N. Y.**—The International Railway has received a franchise from the Council in La Salle over the right-of-way of the old Buffalo, Thousand Islands & Portland Railroad in La Salle.

**Milwaukie, Ore.**—The Portland & Oregon City Railway has again asked the Council for a franchise in Milwaukie. Some time ago Steven Carver, the promoter of the line, withdrew the franchise for some changes, and it was recently submitted at a meeting of the Council, the route having been agreed on. Considerable grading on the line south of Milwaukie to Oregon City has been done, and also on the branch projected toward Clackamas and Logan. It is announced that work will be begun on the section in Milwaukie as soon as the franchise has been granted.

**Seaside, Ore.**—The Council has granted an extension of time on the franchise received by O. W. Taylor two years ago. The extension was granted with the agreement affixed that the rights of the franchise are to be transferred to the new electric line now proposed between Astoria and Seaside. The possession of this franchise has been sought by those promoting the new line. [E. R. J., Nov. 14, '14.]

**Harrisburg, Pa.**—The Harrisburg Railways has received a franchise from the Council to extend its lines to the plant of the Middle Car Company in Harrisburg.

**Montreal, Que.**—The Montreal Council has passed a by-law allowing the Montreal & Southern Counties Railway to extend its tracks across McGill Street to Youville Square in Montreal, with the object of extending its terminals. The city stipulates that it will take no legal responsibility, this clause being inserted in view of the contract of the city with the Montreal Tramways Company, whose lines run along McGill Street. The work is to be commenced before Jan. 1 and completed in six months.

**Corpus Christi, Tex.**—The Texas Southern Electric Com-

pany has received a franchise from the Commissioners' Court of Nueces County to build an electric railway from Corpus Christi to Bishop, 35 miles.

**Dallas, Tex.**—The Metropolitan Street Railway has asked the Council for a franchise to use the Dallas Consolidated Electric Street Railway tracks on Main Street in Dallas.

## TRACK AND ROADWAY

**Birmingham-Tuscaloosa Railroad & Utilities Corporation, Birmingham, Ala.**—As a result of an agreement with the City Council this company will begin work at once on the electrification of the Tuscaloosa Street Railway.

**Tucson (Ariz.) Rapid Transit Company.**—Plans have been made to build an extension north on Stone Avenue to the city limits and beyond the city line to Pastime Park. Another line will be built from the present terminus of the line at Third Street and Park Avenue, north on Park Avenue to the Speedway and east on the Speedway about 1 mile. The south side loop in Tucson will also be constructed at once.

**Fresno (Cal.) Interurban Railway.**—Work has been begun by this company on the 2-mile section of its line from Fresno Avenue, Fresno, via the Normal School to Gould Colony. It is reported that a 12-mile line of the company from Barton's vineyard to Centerville will be constructed on the main line to Clovis. John McCaffery, manager.

**Pacific Electric Railway, Los Angeles, Cal.**—Work has been begun by this company on its 8-mile line between Arlington and Corona. Shearer & Company, Los Angeles, were awarded the contract for the construction of the line.

**San Francisco (Cal.) Municipal Railway.**—Extensions of this railway in San Francisco on Columbus Avenue and through the new Fort Mason tunnel are now ready to be placed in operation. Bids for the construction of the California Street line, 2.07 miles in length, have been called for by the Board of Works for Dec. 2. In addition to the Church Street line, for which several alternate plans are now being compared, other extensions under consideration are as follows: Out Market Street from Kearny to Tenth Avenue; from the present park terminus through the park to the Sunset district; from the Stockton Street line across Market Street and south to the Southern Pacific depot.

**Iowa Railway & Light Company, Cedar Rapids, Ia.**—Right-of-way has been acquired by this company on both sides of river trackage in Cedar Rapids and plans are being made to connect this company's lines with the lines of the Waterloo, Cedar Rapids & Northern Railway. This is part of a plan to spend $500,000 on improvements of its lines in Cedar Rapids.

***Caldwell, Idaho.**—The Caldwell Commercial Club and several other organizations are considering plans to secure the electrification of the Wilder branch of the Oregon Short Line extending from Caldwell to Wilder, 11 miles. J. H. Lowell, Caldwell, is interested.

**Fox & Illinois Union Railway, Aurora, Ill.**—Plans are being considered by this company to extend its line, now being constructed from Yorkville to Morris, on to Dwight. H. H. Evans, president. [E. R. J., Nov. 1, '13.]

**Decatur, Sullivan & Mattoon Traction Company, Mattoon, Ill.**—This company has increased its capital stock from $4,000,000 to $5,000,000. This action was taken at the annual meeting of the stockholders held in Mattoon. The directorate was increased from nine to twelve. John G. Throde, Mattoon, and M. L. Deck and G. A. Stadler, Decatur, were elected directors for the long term and H. H. Temple and A. Spitler, of Mattoon, for the short term. Officers were elected as follows: J. A. McFall, Mattoon, president; George B. Fidler, Mt. Zion, vice-president, and John G. Throde, Mattoon, secretary and treasurer. The company plans to build an electric railway from Decatur through Sullivan to Mattoon, a distance of about 50 miles. [E. R. J., Nov. 29, 13.]

**City Railway, Mount Vernon, Ill.**—Work has been begun by this company on its 4-mile line in Mount Vernon. Its repair shops will be located in Mount Vernon and it will operate three cars. Capital stock, authorized, $40,000. Capital stock, issued, $40,000. Officers: Louis G. Pavey, Mount Vernon, president and general manager; Earl Green, vice-president; C. C. Baldwin, Mount Vernon, secretary and chief engineer, and J. B. Emerson, Mount Vernon, purchasing agent. [E. R. J., April 4, '14.]

**Evansville & New Harmony Traction Company, Evansville, Ind.**—Surveys have been completed between Evansville and New Harmony and bond sales in the communities along the right-of-way are meeting with more success than had been anticipated, and it is announced that construction will be begun by this company in the spring. The line will eventually be extended to Mount Carmel, Ill. [E. R. J., Sept. 19, '14.]

**Arkansas Valley Interurban Railway, Wichita, Kan.**—This company has been authorized to use the Hutchinson Interurban Railway tracks in Hutchinson and will soon build an extension from Halstead to Hutchinson.

**South Covington & Cincinnati Street Railway, Covington, Ky.**—Preliminary arrangements are being made by this company for the extension of the Ft. Mitchell line to Erlanger.

**Kentucky Southwestern Electric Railway, Light & Power Company, Paducah, Ky.**—It is reported that this company expects soon to begin construction of its projected line from Paducah to Murray, Ky., 58 miles. A power house, three substations, carhouses, 1800-ft. trestle and several smaller ones, etc., will be required. The grade will run to about 2 per cent on the maximum with 8-deg. maximum curvature, with about 1,000,000 cu. yd. of material to be handled.

**Bay State Street Railway, Boston, Mass.**—This company is asked to consider the feasibility of the construction of a new line from Montello to South Weymouth, via Cary Hill and West Abington.

**St. Paul Southern Electric Railway, St. Paul, Minn.**—This company has placed its line between Hastings, Neb., and St. Paul, Minn., in operation.

**St. Paul (Minn.) Street Railway.**—This company is asked to consider plans for an extension of its Dale Street and Forest Street line to Ocean Street in St. Paul.

**Metropolitan Street Railway, Kansas City, Mo.**—Engineers have plans for this company by which it will be possible to rebuild the Central Avenue Bridge, as per the plans of the Kaw Valley Drainage Board, without interfering with wagon service over the structure or street cars on the second deck, thus avoiding the necessity for rerouting cars during the construction period.

**United Railways Company of St. Louis, St. Louis, Mo.**—Plans are being considered by this company to build a new system of loops in the downtown district of St. Louis. Several other lines will be extended 3 miles or more. Broadway in North St. Louis will be tapped by two crosstown lines, the Jefferson and Taylor lines.

***Corona, N. Y.**—Plans are being considered to build an electric line from the terminus of the dual subway line at Corona to the Vanderbilt property at Lake Success. It will be double track and will cross the meadows and Flushing Creek by a viaduct and bridge, thence it will extend east parallel with the North Hempstead Road and north of the Black Stump Road and the proposed Grand Central Boulevard. W. K. Vanderbilt, Jr., is said to be interested.

**Buffalo & Lake Erie Traction Company, Buffalo, N. Y.**—During the next few months this company plans to reconstruct about 2 miles of track in Erie.

**Jamestown, Westfield & Northwestern Traction Company, Jamestown, N. Y.**—Surveys are being made by this company for a line south of the present tracks in Westfield from below the canning factory up to the Lake Shore station. It will also build a switch at the station.

**Manhattan & Queens Traction Corporations, New York, N. Y.**—An extension down Sutphin Road to the corner of Pacific Street and Rockaway Road in Brooklyn is being contemplated by this company.

**Yonkers (N. Y.) Railroad.**—Work has been begun on the substitution of a double track for a single one in New Main Street, one of the principal business streets of Yonkers. The improvement will greatly facilitate the operation of the three lines serving the eastern portions of the city.

**Oklahoma (Okla.) Railway.**—As soon as financial backing has been obtained this company will begin work at once on a 15½-mile extension from Oklahoma City to Guthrie.

**Stark Electric Railroad, Alliance, Ohio.**—Within the next

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few months this company plans to make improvements at the eastern terminus of its interurban line into Salem.

**Cleveland (Ohio) Railway.**—The new Warner Avenue extension from Broadway and Miles Avenue, 1 mile south, has been completed and will probably be placed in operation on Dec. 1.

**Ohio Valley Traction Company, Portsmouth, Ohio.**—The officials of this company, after a meeting in Portsmouth on Nov. 19, announced that the greater part of their bonds, amounting to $500,000, has been sold and that work on the traction line between Portsmouth and Ironton, Ohio, will be begun early in the spring.

**Toronto (Ont.) Civic Car Lines.**—Work has been begun on the construction of the Bloor Street West civic car lines in Toronto.

**Toronto, Ont.**—Messrs. E. A. Walberg and John F. Hansen have asked the Board of Control for permission to lay a civic car line on Manor Street or some other cross street in North Toronto, to provide a service for the employees of the Canada Wire & Cable Company in Leaside. The line would connect with the proposed civic car line on Mount Pleasant Avenue. The deputation said that the city could take over the line when it was required in connection with the civic system. The applicants were asked to put their proposal in writing and it will be considered along with the other proposed car lines, for which Comptroller Church wants to submit a $1,000,000 by-law.

**Berks & Lancaster Railway, Lancaster, Pa.**—The contract for the construction of 6½ miles from Kleinfeltersville to Womelsdorf has been awarded to J. A. Vandergrift Company, New York. This line will connect with the lines of the Ephrata & Lebanon Railway. This new line is the connecting link between the lines of the Ephrata & Lebanon Railway and the Reading and Lancaster lines.

**Oxford, Cochranville & Parkersburg Electric Railway, Oxford, Pa.**—This railway project has been abandoned.

**Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.**—This company has opened its new bridge over the Beaver River, near Ellwood City. The structure is 1250 ft. long, 82 ft. high and 29 ft. wide, and cost $160,000. It spans the tracks of the Pennsylvania Railroad lines, the Beaver River and the tracks of the Pittsburgh & Lake Erie Railroad.

**Pottstown & Phoenixville Railway, Pottsville, Pa.**—Work still continues on the extension of this company's line from Sanatoga to Linfield. The section of the line from Miller's Bridge, ½ mile below Sanatoga, to Linfield, a distance of 2½ miles, will be placed in operation in December. Within the next ten days the contract for the extension from Linfield to Spring City will be awarded.

**Titusville (Pa.) Electric Traction Company.**—This company contemplates some important extensions in the near future. Address W. J. Smith, manager, for definite information.

**Tennessee & Kentucky Interurban Electric Railway, Nashville, Tenn.**—Surveys are being made by this company from Jellico, for a distance of 16 miles, through the coal and timber fields located in northern Tennessee. [E. R. J., July 25, '14.]

**Beaumont (Tex.) Traction Company.**—This company is asked to consider plans to extend its line south from Beaumont to the refinery of the Magnolia Petroleum Company.

**Dallas, Tex.**—Work has been begun on the extension of the Southern Methodist University line from the terminus, near Mockingbird Lane, to the campus. The contract for the line has been awarded and the route will be via the Highland Park line, transferring at Abbott Avenue and Euclid Avenue in Dallas. This is part of a plan to build an electric line from the Southern Methodist University to the terminus of the Dallas Consolidated Electric Railway by the Southern Methodist University. [E. R. J., Aug. 8, '14.]

***San Angelo, Tex.**—Plans are being considered to build an electric railway to connect San Angelo, Bronte and Robert Lee.

**Texas City (Tex.) Street Railway.**—An extension to the passenger pier at the foot of Eighth Street in Texas City will soon be built by this company.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.**—This company is asked to consider plans to double track its line on Downer Avenue between Hartford Avenue and Edgewood Avenue in Milwaukee.

## SHOPS AND BUILDINGS

**Iowa Railway & Light Company, Cedar Rapids, Ia.**—At a cost of approximately $80,000 this company has acquired property at and in the vicinity of the northeast corner of Fourth Avenue and Second Street in Cedar Rapids on which it plans to build a new passenger station. The company also plans to build a large freight terminal on the west side of the river at Ninth Avenue.

**Kentucky Southwestern Electric Railway, Light & Power Company, Paducah, Ky.**—During the next few months this company plans to build its new carhouses in Evansville.

**Worcester (Mass.) Consolidated Street Railway.**—Plans are being made by this company to build a new freight depot upon the site of the Geary carhouse in Adams Street, which was burned a few years ago.

**Kansas City (Mo.) Railways.**—The board of control has been granted an extension of time on its report on the selection of a site for an interurban railway station. The board's report would be a recommendation, the selection resting with the City Council. The recommendation probably will be made early in December.

**Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.**—This company's paint and repair shops at Nicollet Avenue and Sixtieth Street, Minneapolis, were destroyed by fire on Nov. 19. Three of the company's gasoline cars were destroyed. The roundhouse and office building near by were saved. The loss is estimated to be about $50,000.

**Mesaba Electric Railway, Virginia, Minn.**—This company has opened its new carhouses and offices just east of Mountain Iron. The company is moving into the new quarters from the temporary frame building that was erected after the fire a year ago. In that fire the carhouses and plant of the company were destroyed. The new buildings which have been erected cost $28,000.

**Ohio Electric Railway, Cincinnati, Ohio.**—Work has been begun by this company on the new freight and passenger station at Fort McKinley, stop No. 7.

**Lehigh Valley Transit Company, Allentown, Pa.**—Plans are being considered by this company to build a new freight station at Marshall and Markley Streets in Norristown.

## POWER HOUSES AND SUBSTATIONS

**Danbury & Bethel Street Railway, Danbury, Conn.**—This company has installed a new 600-kw, 2300-volt turbo-generator, two 200-kw rotary converters and one 300-kw converter in its power house in Danbury.

**Kentucky Southwestern Electric Railway, Light & Power Company, Paducah, Ky.**—Plans are being considered by this company to soon build a new power plant and three substations.

**Ithaca (N. Y.) Traction Corporation.**—Two 300-kw, three-phase, sixty-cycle, 1200-r.p.m., compound-wound, self-starting rotary converters; two 300-kva, three-phase, sixty-cycle, 2200-volt, high tension to rotary volts low tension O. I. S. C. transformers, and one six-panel switchboard will soon be installed by this company at its power house in Ithaca. The apparatus was ordered from the Westinghouse Electric & Manufacturing Company.

**Empire United Railways, Inc., Syracuse, N. Y.**—This company has recently purchased two 400-kva transformers for installation in the substation of the company which is located at Port Byron.

**Cleveland, Youngstown & Eastern Railroad, Cleveland, Ohio.**—Two 300-kw, 600-volt, direct-current, three-phase, sixty-cycle, 1200-r.p.m., compound-wound alternating-current self-starting rotary converters and one five-panel switchboard for the above will soon be installed by this company at its power plant in Cleveland. The apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

**Nashville Railway & Light Company, Nashville, Tenn.**—This company has awarded a contract for installing a 500-kw motor generator set in a new substation which has been built in Nashville.

# Manufactures and Supplies

## ROLLING STOCK

**Buffalo & Depew Railway, Buffalo, N. Y.,** is completing two snow plows in its own shops.

**Northwestern Pacific Railroad, San Francisco, Cal.,** has converted seven of its 57-ft. 3-in. interurban trail coaches into double-end motor coaches.

**Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.,** lost three of its gasoline cars in a fire which destroyed the repair shop and paint plant of the company at Nicollet Avenue and Sixtieth Street on Nov. 19.

**Yuma Valley Railway, Arizona,** through the United States government department of reclamation service, has purchased one 55-ft. all-steel, 200-hp seventy-five passenger gasoline motor car from the McKeen Motor Car Company, Omaha, Neb.

## TRADE NOTE

**Mathias Klein & Sons, Chicago, Ill.,** tool manufacturers, have perfected and are now marketing an improved Klein Haven's clamp adapted for handling plain or stranded wire or cables up to ¾ in. in diameter. The particular feature of construction is the addition of a swing latch which engages with a stud on the lower jaw, thus centralizing the pressure on the cross-bolt, which is strongly made of turned machined steel. The body and handle of this clamp are made of steel forging and the eccentric of hardened tool steel.

## ADVERTISING LITERATURE

**National Tube Company, Pittsburgh, Pa.,** has issued a folder describing male and female "Kewanee" union.

**Ohio Brass Company, Mansfield, Ohio,** has issued a folder illustrating the features of its Type C section insulator.

**Prepayment Car Sales Company, New York, N. Y.,** has issued a folder entitled "The Melting Pot" in regard to prepayment platforms.

**W. W. Lindsay & Company, Philadelphia, Pa.,** contracting engineers, have issued a booklet containing illustrations of new construction work built by the company, which include, among others, a view of the handsome power house of the Charleston (S. C.) Consolidated Railway & Lighting Company, and the carhouses of the Springfield Railway and the People's Railway, Dayton, Ohio.

**Hess-Bright Manufacturing Company, Philadelphia, Pa.,** has issued a series of sheets on its ball bearings for various uses. Sheet 101 describes vertical mountings on shafts without shelters; Sheet 102, standard mountings for horizontal and vertical ball bearing electric motors; Sheet 103, ball bearings as applied to turbine pumps; Sheet 106, ball-bearing live-tail centers, and Sheet 107, ball-bearing lathe heads.

**Continental Fibre Company, Newark, Del.,** has issued a catalog describing its insulating products, vulcanized fiber, "Bakelite-Dilecto" and "Continental Bakelite" for insulation of armatures, brakeshoes, dynamos, motors, magnetos, transformers, railway signals, high-tension cable conduits and track insulation, in connection with electric track circuit signals. The peculiar characteristics of each of these materials is explained in detail, together with their fields of usefulness. Although manufactured primarily as insulating materials, their physical qualities render them adaptable to a wide range of mechanical applications.

**Dayton Fare Recorder Company, Dayton, Ohio,** has issued a folder describing its computing fare recorders for city and interurban railways, which are designed to dispense with figure drudgery in fare collecting and accounting and also to avoid the inevitable mistakes and losses that go with it and to provide, instead, printed records of the fare receipts fully itemized, computed and summarized ready to be delivered at the receiver's window when the conductors make settlement. No clerical work either by conductors or receiving clerks is required to determine the amount of fare collected. The folder contains a reproduction of a printed record produced from a twelve-fare interurban recorder, which illustrates the principle of double registration and recording used on all recorders of the different sizes.

**H. Edsil Barr, Erie, Pa.,** engineer and manufacturer, has issued a folder describing and illustrating his pneumatic light forging hammer for machine shops. As illustrations in the catalog show, this hammer is similar in appearance to a steam hammer and operates on the same plan—by the use of pressure in a suitable cylinder to lift and throw the ram. The hammer consists of a heavy anvil or die block, cast solid and with provisions for bolting down. Cast with the anvil is a heavy box frame or housing strongly reinforced inside and supporting the cylinder. In the cylinder operates the piston which drives the ram or hammer head, and the movement of the ram is controlled entirely by the operator who presses the foot lever, thus operating the valve, which admits air under pressure to the cylinder.

**Drew Electric & Manufacturing Company, Indianapolis, Ind.,** has issued a 107-page catalog, No. 3, describing its complete line of electric railway, light and power materials. These materials include clinch gears, splicing gears, line suspensions, trolley frogs, trolley switches, tunnel approaches, trolley crossings, section insulators, motorman's safety mirrors, pole sleeves, telephone jack boxes, night car stop signals, pipe insulators, hangers, strain insulators, turnbuckles, flexible brackets, high-voltage insulators, cross-arm supports, Garton-Daniels lightning arresters and choke coils, anchor rods, machine bolts, galvanized iron and steel wire, lamp sockets and other miscellaneous tools. At the end of the catalog are useful tables and data governing the selection of wire according to weight, diameter, resistance and other physical properties, and also tables for selecting iron pipes as poles. An illustration shows one of the largest and most intricate pieces of overhead construction on the lines of the Indianapolis Traction & Terminal Company at Illinois and Washington Streets in the city of Indianapolis, supplied by this company. The intersecting streets at this point are 90 ft. wide. The width of the streets requires the supporting wires to be very long, thus making the maintenance and proper alignment very difficult. As this point is the central transfer junction in the city and in the heart of the conjested downtown district, uninterrupted movement of cars is important to both the company and the public. A total of 3724 regular, and about fifty to seventy-five special, cars pass under this equipment every twenty-four hours. The average renewal of material in this particular case has been two and three-quarters years, during which time nearly 4,000,000 car passings occurred. The back of the catalog contains a convenient index for referring to the materials described.

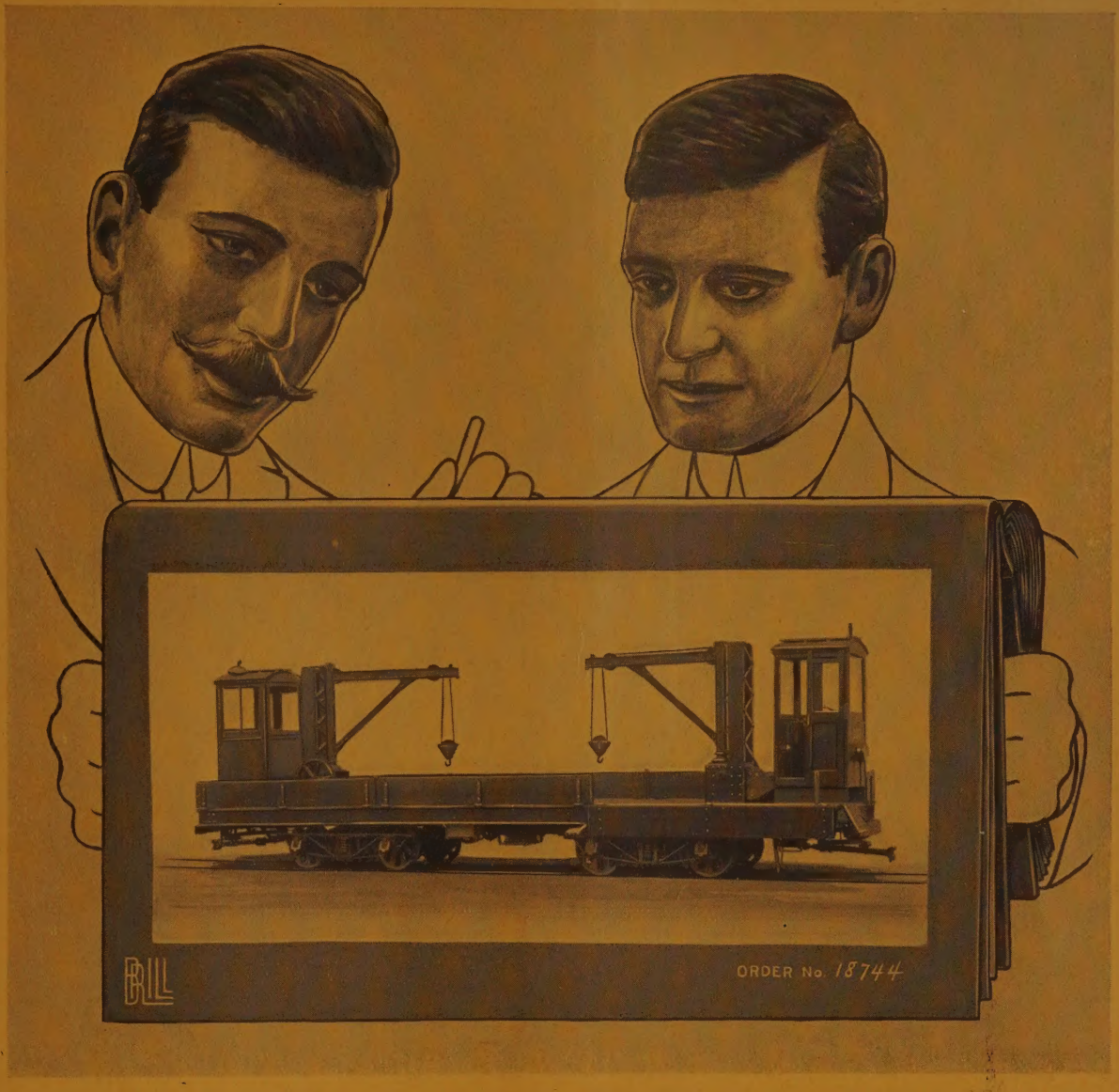
## LABOR QUESTIONS IN CLEVELAND

Having been informed by the director of public service that the City Council of Cleveland, Ohio, cannot dictate working hours and conditions on the Cleveland Railway, George R. Davies, president of the branch of the Amalgamated Association in that city, has intimated that the officers of the company will be prosecuted under section 9007 of the general code, which is intended to insure eight hours' rest out of the twenty-four for all railroad men on interurban and street railroads. This section provides that on a railroad more than 30 miles long or interurban or street railway more than 4 miles long, men who have worked fifteen consecutive hours shall not be permitted to go on again until they have had at least eight hours' rest, except in case of accident. Very few, if any, men are called upon to work fifteen consecutive hours. Mr. Davies blames the schedules more than he does the officials of the company for what he terms poor conditions.

The Cleveland Railway will pay $600 of the expenses of the recent arbitration proceedings between it and the men. Attorney Charles Higley, representative of the company, will receive $500 and A. B. Thompson, the third arbitrator, $200. Judge Willis Vickery, selected by the men, will not present a bill. The union organization will pay the remainder of the amount.

The City Council yielded to the plan of collecting funds in the fare boxes of the cars on Nov. 25 for the benefit of the Associated Charities, which has a deficit of some $30,000. The average of the receipts for Sunday, Monday and Tuesday of the week will be taken as the portion for the company on Wednesday. Whatever sum above this amount is found in the boxes will be donated to the charitable organization.

# BRILL WORK CARS

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